file

ENVIRONMENTAL ASSESSMENT OF THE REALIGNMENT OF UNITS AT McCHORD AIR FORCE BASE, WASHINGTON

February 1990

U.S. AIR FORCE
Headquarters Military Airlift Command
Scott Air Force Base, Illinois

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	FEBRUARY 1990	EA FEB 1990

4. TITLE AND SUBTITLE
Environmental Assessment of the Realignment of Units at McChord AFB, WA.

5. FUNDING NUMBERS

6. AUTHOR(S)
HQ Military Airlift Command

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
HQ MAC
Scott AFB, IL

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Air Force

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
N/A

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution is unlimited.

12b. DISTRIBUTION CODE
A

13. ABSTRACT *(Maximum 200 words)*

14. SUBJECT TERMS
McChord Realignment

15. NUMBER OF PAGES
50

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclas	Unclas	Unclas	UL

COVER SHEET

LEAD AGENCY:

Military Airlift Command (MAC), United States Air Force

TITLE:

Environmental Assessment of the Realignment of Units at McChord Air Force Base, Washington

ABSTRACT:

The action for this Environmental Assessment (EA) consists of the realignment of various aircraft and manpower authorization assets from Norton Air Force Base (AFB), which will be closed, to McChord AFB. The relocation actions will include transfers of personnel authorizations, aircraft, and various other equipment and material. Other, previously programmed force structure changes at McChord AFB also are assessed in order to identify possible cumulative impacts.

The EA assesses the environmental impacts associated with the actions. The areas of potential impact analyzed are air quality, noise, hazardous materials, wastes and stored fuels, water resources, vegetation and wildlife resources, threatened and endangered species, cultural resources, land use, and socioeconomics. The EA describes the baseline conditions, potential environmental impacts (beneficial and adverse), and planned mitigations of adverse impacts. The Base Closure and Realignment Act specifically exempts this EA from considering the need, purpose, or reason for the realignment from Norton AFB to McChord AFB.

BLANK PAGE

SUMMARY

As a result of the recommendation of the Defense Secretary's Commission on Base Realignment and Closure, 12 C-141 primary aircraft authorizations (PAA), with appropriate manpower positions, will be transferred from the 63rd Military Airlift Wing at Norton Air Force Base (AFB), California, to McChord AFB, Washington. This action will affect not only active duty assets, but also corresponding Reserve manpower authorizations from the 445th Military Airlift Wing. Although not specifically addressed by the Commission, the 22nd Air Force Noncommissioned Officers Leadership School also will be relocated from Norton AFB to McChord AFB. In addition, previously programmed force structure changes (unrelated to closure) for McChord AFB include redesignation of the 36th Tactical Airlift Squadron as the 36th Military Airlift Squadron, deactivation of the 318th Fighter Interceptor Squadron, and transfer of two C-141 aircraft from Travis AFB. These basing changes have resulted in the removal of 8 C-130E and 18 F-15A/B PAA aircraft from McChord AFB. Some facility construction and modification projects would be associated with these changes. This environmental assessment evaluates the cumulative potential impacts of the realignment and the basing changes that have already occurred or are proposed for McChord AFB.

The cumulative impacts of the realignment, deactivation, and transfer would generally be positive. Increases in noise and air pollutant emissions of nitrogen oxides, particulate matter, and sulfur dioxide associated with the increase in C-141 operations would be offset by reductions in noise and emissions from deactivations. However, total emissions of carbon monoxide and hydrocarbons would increase by 4.8% and 12%, respectively. Predicted increases in concentrations of these two pollutants at the base boundary are small. The concentrations of all air pollutants at the base boundary would be well within air quality standards.

No deterioration in the quality of land, groundwater, or surface water resources would result from the proposed action. Small areas of vegetation would be removed during the associated construction activities, but this removal should not jeopardize any threatened or endangered species. Construction would avoid areas with the potential for archeological sites. No significant socioeconomic impacts are expected from changes in personnel authorizations.

Although some minor impacts from erosion and runoff could occur during facility construction and modification activities associated with the action, no major adverse environmental impacts are expected.

CONTENTS

CONTENTS (Cont'd)

TABLES

TABLES (Cont'd)

FIGURES

FIGURES (Cont'd)

ABBREVIATIONS AND ACRONYMS

AAMRL	Armstrong Aerospace Medical Research Laboratory
AFB	Air Force Base
AFR	Air Force Regulation
AGL	above ground level
AFRES	Air Force Reserves
AICUZ	air installation compatible use zone
ANG	Air National Guard
ANL	Argonne National Laboratory
APZs	accident potential zones
ART	Air Reserve technicians
Assoc.	Associates
BAI	backup aircraft inventory
Bldg.	building
BOS	base operating support
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
Co.	company
CZs	clear zones
dB	decibels
DOD	Department of Defense
EA	environmental assessment
EIS	environmental impact statement
EPA	Environmental Protection Agency
Fig.	figure
FIS	Fighter Interceptor Squadron
ft	feet
ft^2	square feet
FY	fiscal year
gal	gallons
HC	hydrocarbons
Inc.	incorporated
IRP	Installation Restoration Program
J.	journal
JP-4	a type of jet fuel
km	kilometers
L_{dn}	day/night average sound level
MAC	Military Airlift Command
MAS	Military Airlift Squadron
MAW	Military Airlift Wing
mi	miles
mi^2	square miles
$\mu g/m^3$	micrograms per cubic meter
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter

m/s	meters per second
MOAs	military operations areas
NCOLS	Noncommissioned Officers Leadership School
NEPA	National Environmental Policy Act of 1969
NO_x	nitrogen oxides
NPS	National Park Service
NRHP	National Register of Historic Places
NZs	noise zones
O_3	ozone
PAA	primary aircraft authorizations
PM_{10}	particulate matter, particles with a diameter equal to or less than 10 micrometers
ppm	parts per million
Sec.	section
SEL	sound exposure level
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
TAC	Tactical Air Command
TAS	Tactical Airlift Squadron
TSP	total suspended particulates
U.S.	United States
USAF	U.S. Air Force
Wash.	Washington
yd^2	square yards

ENVIRONMENTAL ASSESSMENT OF THE REALIGNMENT OF UNITS AT McCHORD AIR FORCE BASE, WASHINGTON

1 INTRODUCTION

1.1 PURPOSE OF THE ACTIONS

Two categories of actions at McChord Air Force Base (AFB) in the state of Washington are reviewed in this assessment -- (1) realignment actions related to closure of Norton AFB in California, and (2) other, previously programmed force structure changes affecting McChord AFB.

1.1.1 Realignment Actions

The Defense Secretary's Commission on Base Realignment and Closure was chartered on May 3, 1988, to recommend military installations within the United States, its commonwealths, territories, and possessions for realignment and closure. Subsequently, the Base Closure and Realignment Act (Public Law 100-526, October 24, 1988) endorsed the Secretary's Commission and required the Secretary of Defense to implement its recommendations unless either he rejected them in their entirety or the Congress passed (and the President signed) a Joint Resolution disapproving the Commission's recommendations.

The primary criterion used by the Commission to identify candidate bases was the military value of the installations. However, cost savings also were considered, as were the current and projected plans and requirements for each military service. Lastly, the Commission focused its review on military properties and their uses, not on military units or organizational/administrative issues.

On December 29, 1988, the Commission recommended the realignment and closure of 145 military installations. Of this number, 86 are to be closed fully, 5 are to

be closed in part, and 54 will experience a change (either an increase or decrease) as units and activities are relocated.

On January 5, 1989, the Secretary of Defense approved those recommendations and announced that the Department of Defense (DOD) would implement them. The Congress did not pass a Joint Resolution disapproving the recommendations within the time allotted by the Act. Therefore, the Act now requires the Secretary of Defense, as a matter of law, to implement those closures and realignments. Implementation must be initiated by September 30, 1991, and must be completed no later than September 30, 1995.

Among the Commission's recommendations was the closure of Norton AFB. This was to include the realignment of the 63rd Military Airlift Wing (MAW) and its Reserve Associate unit primarily to March AFB. The Air Force is now preparing to inactivate most of this wing and its associate. Prior to inactivation there will be a relocation from Norton AFB to McChord AFB of one squadron complement of C-141 aircraft (12 primary aircraft authorizations [PAA]) and the associated active duty and Reserve Associate flying, maintenance, and other support personnel. Current plans for the remaining C-141 aircraft are to move them to March AFB or retire them. Additional realignment of units from Norton AFB will be to Los Angeles AFB and Travis AFB in California; Kirtland AFB in New Mexico; and Luke AFB in Arizona.

Additional environmental assessments (EAs) or environmental impact statements (EISs) are being prepared for the other realignments mentioned above. In addition, one EIS will be prepared to analyze the impacts caused by the closure (withdrawal of units) of Norton AFB, and one will be prepared to assess the final disposition of the base property (including potential reuse).

The 22nd Air Force Noncommissioned Officers Leadership School (NCOLS), although currently located at Norton AFB, was not specifically addressed by the Secretary's Commission on Base Realignment and Closure. McChord AFB was the most

cost-effective relocation site for the 22nd NCOLS. MAC and other major commands will save $110,000 annually in student temporary duty costs at this new location.

1.1.2 Previously Programmed Force Structure Actions

In addition to evaluating the realignment actions at McChord AFB related to realignment of units from Norton AFB, this assessment evaluates previously programmed force structure actions that will occur or have already occurred at McChord AFB since the beginning of this analysis and that were analyzed in separate environmental documents (Air National Guard [ANG] 1989a; Department of the Air Force 1987c). These other actions are evaluated in order to identify possible cumulative impacts. These other, previously programmed actions are (1) redesignation of the 36th Tactical Airlift Squadron (TAS), (2) transfer of two C-141 aircraft from Travis AFB, and (3) deactivation of the 318th Fighter Interceptor Squadron (FIS). The reasons for these actions are summarized below.

Redesignation of 36th TAS -- As a result of fiscal constraints, the Office of Secretary of Defense directed the Military Airlift Command (MAC) to inactivate the 36th TAS in the first quarter of Fiscal Year (FY) 1990. Concurrently, the commander-in-chief of MAC directed that a third C-141B squadron be established at McChord AFB. Redesignating the 36th TAS with C-130E aircraft as the 36th Military Airlift Squadron (MAS) with C-141B aircraft would accomplish this objective. Before this redesignation can occur, the 36th TAS must first be deactivated. This includes the removal of eight C-130E aircraft and two backup aircraft inventory (BAI) C-130E aircraft. The 36th MAS will then be activated as a C-141B squadron, joining the 4th MAS and 8th MAS as the third C-141 squadron at McChord AFB. The 36th TAS was selected for this deactivation because McChord AFB is a single-unit operating location for C-130 aircraft and thus requires more equipment and maintenance positions per aircraft than does a multisquadron location. Other active-duty C-130 bases within the continental United

States have two or more squadrons with a standard of 16 C-130 PAA aircraft each. Furthermore, the 36th TAS is not able to participate in MAC's European rotation because this rotation requires a complement of 16 C-130 aircraft.

Transfer of Two C-141 from Travis AFB -- McChord AFB currently has three unequally equipped C-141 squadrons. The transfer of two additional PAA C-141B aircraft to McChord AFB from Travis AFB and subsequent redistribution of assets will provide for three 12-PAA C-141B squadrons. The objective of this transfer is to equalize the aircraft complement per squadron.

Deactivation of 318th FIS -- The U.S. Air Force (USAF) has deactivated the 318th FIS in response to Congress's mandate to reduce the defense budget.

1.2 SCOPE OF THE ENVIRONMENTAL REVIEW

Under the National Environmental Policy Act of 1969 (NEPA), federal agencies are required to take into consideration the environmental consequences of proposed actions in the decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee federal policy in this process. To this end, CEQ has issued *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] 1500-1508). The CEQ regulations specify that an environmental assessment serves to:

- Provide brief discussions of the need for the proposed action and discussions of impacts associated with the proposed action and alternatives.
- Briefly provide evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact;

- Aid in an agency's compliance with the Act (NEPA) when no environmental impact statement is necessary; and
- Facilitate preparation of a statement when one is necessary.

The Base Closure and Realignment Act requires that the implementing actions conform to the provisions of NEPA, as implemented by the President's Council on Environmental Quality regulations. In addition, this EA also follows Air Force Regulation (AFR) 19-2, which implements both NEPA and the CEQ regulations within the Air Force system. However, the Act also modified NEPA to the extent that the environmental analysis need not consider:

- The need for closing or realigning a military installation selected for closure or realignment by the Commission;
- The need for transferring functions to another military installation that has been selected as the receiving installation; or
- Alternative military installations to those selected.

For those other actions being assessed in this EA, all requirements under AFR 19-2 must be met.

2 DESCRIPTION OF ACTIONS AND ALTERNATIVES

2.1 DESCRIPTION OF THE ACTIONS

2.1.1 Realignment Actions

As a result of the recommendation of the Defense Secretary's Commission on Base Realignment and Closure, assets of one squadron comprising 12 PAA C-141 aircraft, with appropriate manpower authorizations, will be transferred from the 63rd MAW at Norton AFB, California, to the 62nd MAW at McChord AFB, Washington. The transfer will begin in the second quarter of FY 1990 and will be completed by the second quarter of FY 1992. With the transfer of the 63rd MAW assets, the 445th MAW (Associate) of the Air Force Reserve (AFRES) also will relocate a corresponding number of manpower authorizations into the 446th MAW (AFRES) at McChord AFB.

In the airlift mission, the flying units are either Active, Reserve, or Active/Reserve Associate squadrons. Separate Active and Reserve squadrons normally differ in size and have their own aircraft, aircrews, base operating support, and maintenance personnel. On the other hand, the Active/Reserve Associate squadrons are about the same size and both fly and maintain the active force's aircraft. In this cooperative relationship, the active squadron provides all the aircraft and approximately half of the crews and maintenance personnel. The Reserve Associate squadron provides the other half of the aircrews and maintenance personnel to fly and maintain the aircraft assigned to the active squadron. The transfer of the Active and Reserve Associate assets to the 62nd MAW and 445th MAW (Associate), respectively, will include the 12 PAA C-141B aircraft and approximately 16,700 annual flying hours. The basic mission of the affected units will remain unchanged, as will the land and airspace usage at McChord AFB.

In addition to the transfer of flying unit assets, the 22nd NCOLS will be relocated to McChord AFB.

In all, about 681 full-time military and civilian personnel authorizations and an additional 405 part-time (AFRES drill) personnel authorizations will be transferred from Norton AFB to McChord AFB. To accomplish routine actions requiring a constant presence, a small proportion of all Reserve and Reserve Associate units employ Air Reserve technicians (ARTs). This is a full-time civilian position. As a condition of employment, the person holding the position must continue to serve in the Air Force Reserve. To avoid double counting, ARTs are tallied against the Reserve manpower authorizations and not the civilian authorizations. Table 2.1 shows the personnel authorizations involved in the realignment actions and the other force structure actions being reviewed in this EA.

Some new facilities will be constructed and some existing facilities will be modified or upgraded to provide adequate support functions for the proposed unit realignments at McChord AFB. The locations of these new construction and facility alteration projects are shown as darkened areas on Fig. 2.1. These efforts, estimated to cost $33 million, are listed in Table 2.2.

2.1.2 Previously Programmed Force Structure Actions

In addition to the changes resulting from the closure of Norton AFB and related unit realignments, other changes anticipated at McChord AFB within the same time frame are evaluated in this EA. These basing changes are described below.

Transfer of Two PAA C-141B Aircraft from Travis AFB to McChord AFB, Effective the Second Quarter of FY 1990 -- This would allow the formation of a third C-141B operational squadron from existing personnel authorizations and the addition of 13 officers, 66 enlisted personnel, and 1 civilian position. Of these 80 positions, 71 would

TABLE 2.1 Changes in Personnel Authorizations at McChord AFB Resulting from Realignments and Previously Programmed Force Structure Actions

Category	Personnel Authorization Changes		
	Military	Civilian	Total
Movement of C-141 Assets from Norton AFB			
Active Duty	+512	+1	+513
Air Reserve Technicians	+70	0	+70
Reserve Drill (part-time)	+405	0	+405
22nd Air Force NCOLS	+12	0	+12
Base Operating Support (BOS)	+65	+21	+86
Movement of C-141 Assets from Travis AFB			
Active Duty	+79	+1	+80
Reserve Drill (part-time)	+56	0	+56
Base Operating Support	+6	+2	+8
Deactivation of 36th TAS and 318th FIS			
Active Duty			
36th TAS	-352	-1	-353
318th FIS	-548	-12	-560
Base Operating Support	-102	-33	-135
Cumulative Changes			
Part-time	+461	0	+461
Full-time	-258	-21	-279

Source: Calliott 1990.

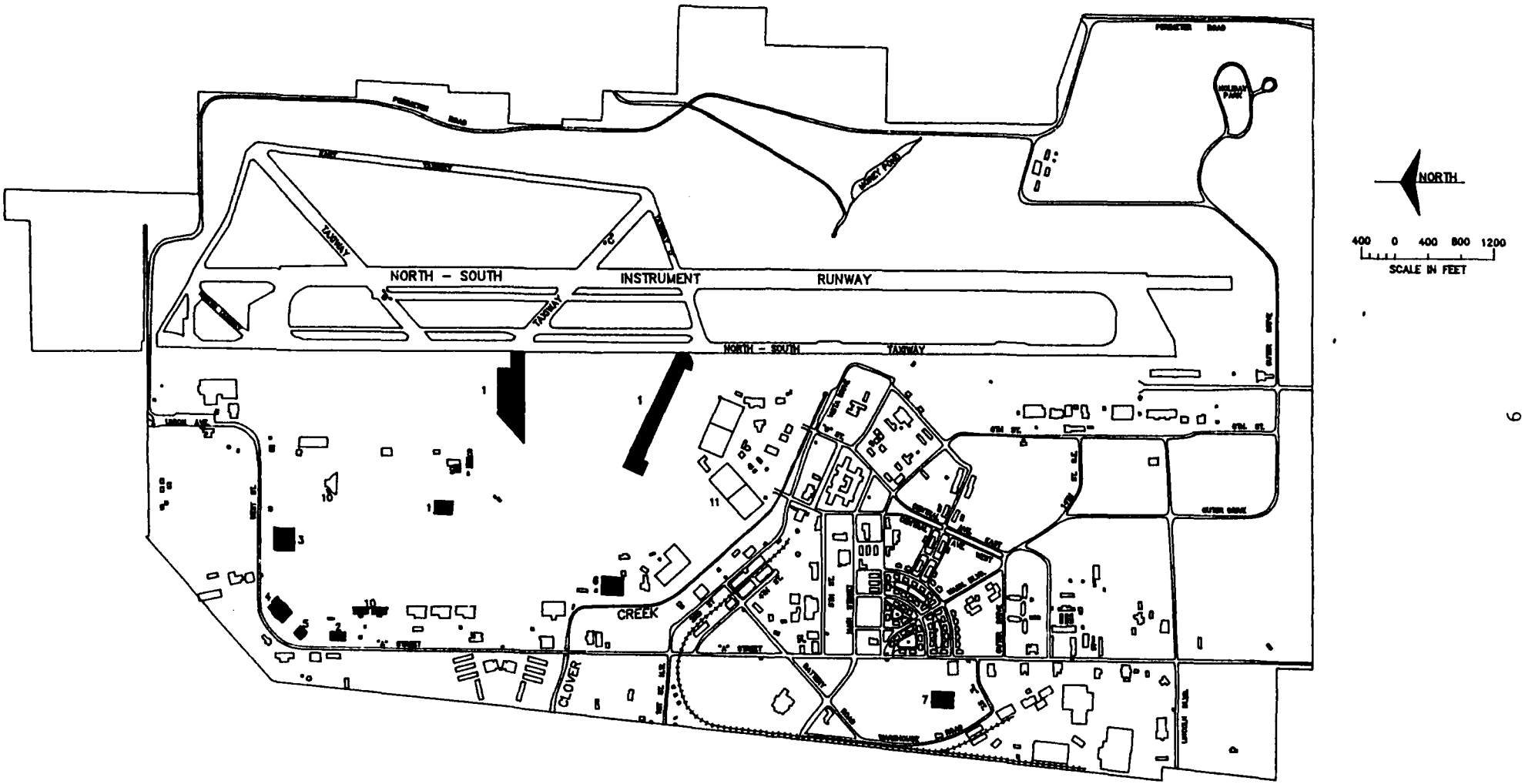

FIGURE 2.1 Layout of McChord AFB Operational Areas (darkened areas represent new construction or facility alterations; the numbers identifying the facilities are keyed to the list in Table 2.2)

TABLE 2.2 Facility Construction and Alteration Projects

Facility[a]	Area	Funding Schedule (FY)
Construction		
1. Refueling hydrants, parking apron, fuel tanks, pump station	53,500 yd^2	1990
2. Aerospace ground equipment facility	15,400 ft^2	1990
3. Aerial delivery facility	33,400 ft^2	1990
4. Active-duty squadron operations building	34,900 ft^2	1991
5. AFRES squadron operations building	13,200 ft^2	1991
6. Weapons systems maintenance management facility	21,800 ft^2	1991
7. Air Force NCOLS and dormitory	23,500 ft^2	1991
8. Aircraft maintenance operating support system	5,000 ft^2	1991
9. Addition to organizational maintenance squadron facility	2,500 ft^2	1991
10. Addition to fuel system maintenance dock	1,000 ft^2	1991
Alteration		
11. Alter hangar and nose docks	-	1991

[a]Facility ID numbers to the left of each entry are keyed to locations shown in Fig. 2.1.

Source: Wells 1990.

be transferred from Travis AFB. In addition to the active force changes, approximately 56 Associate Reserve manpower positions would transfer to McChord AFB (see Table 2.1). The annual C-141 flying time at McChord AFB would increase by approximately 2,350 hours. The overall objective of splitting the wing's C-141 assets from two 17 PAA squadrons into three 12 PAA squadrons is to improve the flying squadron commander's span of control, thus affording the commander more time to concentrate on overall planning, direction, coordination, and control.

Deactivation of the 36th Tactical Airlift Squadron, Effective the First Quarter of FY 1990 -- The removal of 8 PAA C-130E aircraft and 2 BAI C-130E aircraft has resulted in a manpower reduction of 54 officers, 298 enlisted personnel, and 1 civilian position, as shown in Table 2.1. (These numbers do not include base operating support [BOS]). Annual flying time has been reduced by 5,768 hours. This action was analyzed previously in a separate environmental document (Department of the Air Force 1987c); *this environmental assessment includes evaluation of* the cumulative effects of this deactivation. The eight C-130E aircraft have been transferred to the Air National Guard (ANG) for use at Quonset State Airport ANG Station, Rhode Island; Martin State ANG Station, Maryland; and Eastern West Virginia Regional/ Shepherd Field ANG Station, West Virginia (ANG 1989b).

Deactivation of the 318th Fighter Interceptor Squadron, Occurred the First Quarter of FY 1990 -- The 18 PAA F-15A/B aircraft assigned to the 318th FIS have been transferred to the ANG's 142nd Fighter Inceptor Group, Portland, Oregon, resulting in a reduction of 560 personnel (not including BOS) at McChord AFB, as shown in Table 2.1, and a reduction of 5,224 annual flying hours. This action was analyzed previously in a separate environmental document (ANG 1989a). This environmental assessment includes evaluation of the cumulative effects of this deactivation.

Table 2.3 summarizes the changes resulting from the realignments from Norton AFB and implementation of the previously programmed structure changes.

TABLE 2.3 Changes Resulting from the Realignments from Norton AFB and Implementation of Previously Programmed Force Structure Changes

Category	Personnel Authorizations		Number of Aircraft	Total Aircraft Operations	
	Full-Time	Part-Time[a]		Day	Night
Movement of C-141 aircraft from Norton AFB	+681	+405	+12	+32	+1
Movement of C-141 aircraft from Travis AFB	+88	+56	+2	c	c
Deactivation of C-130 squadron (36th TAS)	-405	0	-8 PAA[b]	-16	-3
Deactivation of F-15 squadron (318th FIS)	-643	0	-18 PAA	-63	-7

[a]Reserve drill.

[b]Two BAI C-130 (not having flying hours or crews assigned against them) also left.

[c]Included in numbers above.

Source: Calliott 1990.

2.2 DESCRIPTION OF ALTERNATIVES

2.2.1 Alternatives to the Realignment Actions

The Base Closure and Realignment Act (the Act) requires that the implementation actions conform to the provisions of NEPA, as implemented by the President's Council on Environmental Quality (CEQ) regulations. In addition, this EA also follows Air Force Regulation 19-2, which implements both NEPA and the CEQ regulations within the USAF system. However, the Act also modified NEPA to the extent that the environmental analysis need not consider the following:

- The need for closing or realigning a military installation selected for closure or realignment by the Commission;
- The need for transferring functions to another military installation that has been selected as the receiving installation, or
- Alternative military installations to those selected.

Because the Act requires implementation of the closure/realignment, *no action* is not an alternative and is not specifically included. However, Chapter 3 of this EA presents the environmental conditions associated with the installation and its operations. These conditions serve as the baseline against which the implementation impacts are judged.

While there was no alternative location considered for the movement of the 12 C-141 PAA aircraft from Norton AFB, there were alternatives to accomplish this move. The decision was made to begin the realignment by transferring two aircraft in the second quarter of FY 1990 and two more in the second quarter of FY 1991. The transfers were scheduled for these times to demonstrate the Air Force's desire to move quickly on the Commission's recommendations. The remaining eight aircraft will be moved in the second quarter of FY 1992, as soon as necessary ramp space is available and other construction is completed.

Because the Commission's recommendations did not specifically locate the site for the realignment of the 22nd NCOLS, alternative sites must be addressed. The locations of the expected student population were evaluated, as were the costs of student travel. Based upon that analysis, four alternative locations for the school were identified: Travis, Scott, Little Rock, and Nellis AFBs. McChord AFB proved to be the most cost-effective site for the school. Therefore, alternative locations will not be considered further in this document.

2.2.2 Alternatives to the Previously Programmed Force Structure Actions

Alternatives to the additional basing changes proposed for McChord AFB are discussed below.

Alternatives to Deactivation of C-130E Squadron -- Because funding and authorization for 8 PAA C-130E aircraft have been removed for FY 1990, the no-action alternative would require that funding and authorization for 8 PAA C-130E aircraft be removed from some other MAC mission and be redirected to fund continuation of the 36th TAS activity. Other C-130 squadrons rotate to Europe every 65 days. A squadron that participates in this rotation requires 16 aircraft. Because the 36th TAS had only 8 PAA aircraft, it could not participate in this rotation. Thus, deactivation of 8 PAA C-130E aircraft in a different C-130 squadron would reduce the number of squadrons available for rotation and affect this overseas rotation requirement in support of NATO commitments.

Alternatives to Transfer of Two C-141B Aircraft from Travis AFB -- The two C-141B aircraft could be transferred from a base other than Travis AFB. However, Travis AFB currently has two 17-PAA C-141 squadrons that could be reduced to two standard 16-PAA C-141 squadrons. Selection of Travis AFB aircraft would, therefore, more equally distribute the C-141 force structure.

Alternatives to Deactivation of F-15 Squadron -- In evaluating potential alternatives to the deactivation of the 318th FIS, the need to maintain overall mission capability must be taken into consideration. Any alternative for which no mission backup is available or that decreases combat capability is operationally unsuitable. Alternatives should meet the basic and collateral requirements for this action: reduction of total USAF funding outlays, reduction in programmed active-duty manpower, and transfer of missions to Reserve forces when possible. The F-15 aircraft assets have been transferred to the Oregon ANG Station at Portland International Airport with an active flying mission and will remain available for national defense. Possible alternatives that were considered are discussed below.

- *Deactivation of an F-15 Training Squadron* -- In tactical fighter aviation, a standard programming factor is that dedicated training aircraft equal 25% of combat aircraft to provide sufficient aircrews to fill cockpit requirements. While drawdown of combat aircraft allows a corresponding 25% drawdown in training aircraft, drawdown of a F-15 training squadron without offsetting reductions in combat aircraft would leave the Tactical Air Command (TAC) unable to adequately train the remainder of the force. The result would be an unacceptable impact to worldwide F-15 units -- both general purpose and strategic defense. This alternative will not be considered further.
- *Deactivation of a General Purpose F-15 Squadron* -- No other aircraft in the inventory is so uniquely suited to maintaining theater air superiority. Thus, there is no backup for mission capability in the general purpose force. This alternative will not be considered further.

- *No Action* -- No action is not a viable option because of mandated budget cuts. For reasons already given, these budget cuts could not be applied against F-15 general purpose or training squadrons. The only candidates were the two F-15 fighter interceptor units, one at McChord AFB and one at Langley AFB. Because the perceived threat was greater for the Atlantic area, deactivation of the Langley unit was not a viable alternative. The only remaining alternative was to inactivate the McChord AFB squadron.

3 AFFECTED ENVIRONMENT

3.1 LOCATION, HISTORY, AND CURRENT MISSION OF McCHORD AFB

McChord AFB is located in western Washington, about 5 mi east of Puget Sound and 1 mi south of the city limits of Tacoma in Pierce County (Fig. 3.1). Interstate 5, which is west of the base, serves as a major access route to McChord AFB (Fig. 3.2). A number of unincorporated communities are located around the base, including Lakewood, Tillicum, Ponders, Brookdale, Spanaway, Parkland, and Steilacoom.

The city of Tacoma had an estimated 1986 population of 158,950; Spanaway had a 1980 population of 8,868; Parkland 23,355; and Steilacoom 4,886. The other communities had less than 2,500 residents. Seattle, about 30 mi to the north in King County, had a 1980 population of 493,846.

McChord AFB occupies an area of approximately 4,600 acres. As shown in Fig. 3.2, the southern border of the base is contiguous to Fort Lewis Military Reservation, a large Army installation occupying 86,000 acres. (Figure 3.2 also shows the locations, numbered 1 through 12, of nearby schools, residential areas, and a hospital selected for analysis of noise impacts; Table 3.1 identifies the numbered locations.) The layout of McChord AFB operational areas was shown in Fig. 2.1. The base maintains one operational runway (Runway 16/34), which is 10,100 ft long and 150 ft wide.

McChord AFB became a military installation in 1938 following presentation of a portion of the present land area to the government as a gift from Pierce County. The base was formally dedicated in July 1940 and was named in honor of Colonel William C. McChord, U.S. Army Air Corps, who was killed in an aircraft crash in 1937. At the outset, the field was under the 6th Air Force, and during World War II it was used principally as a bomber base.

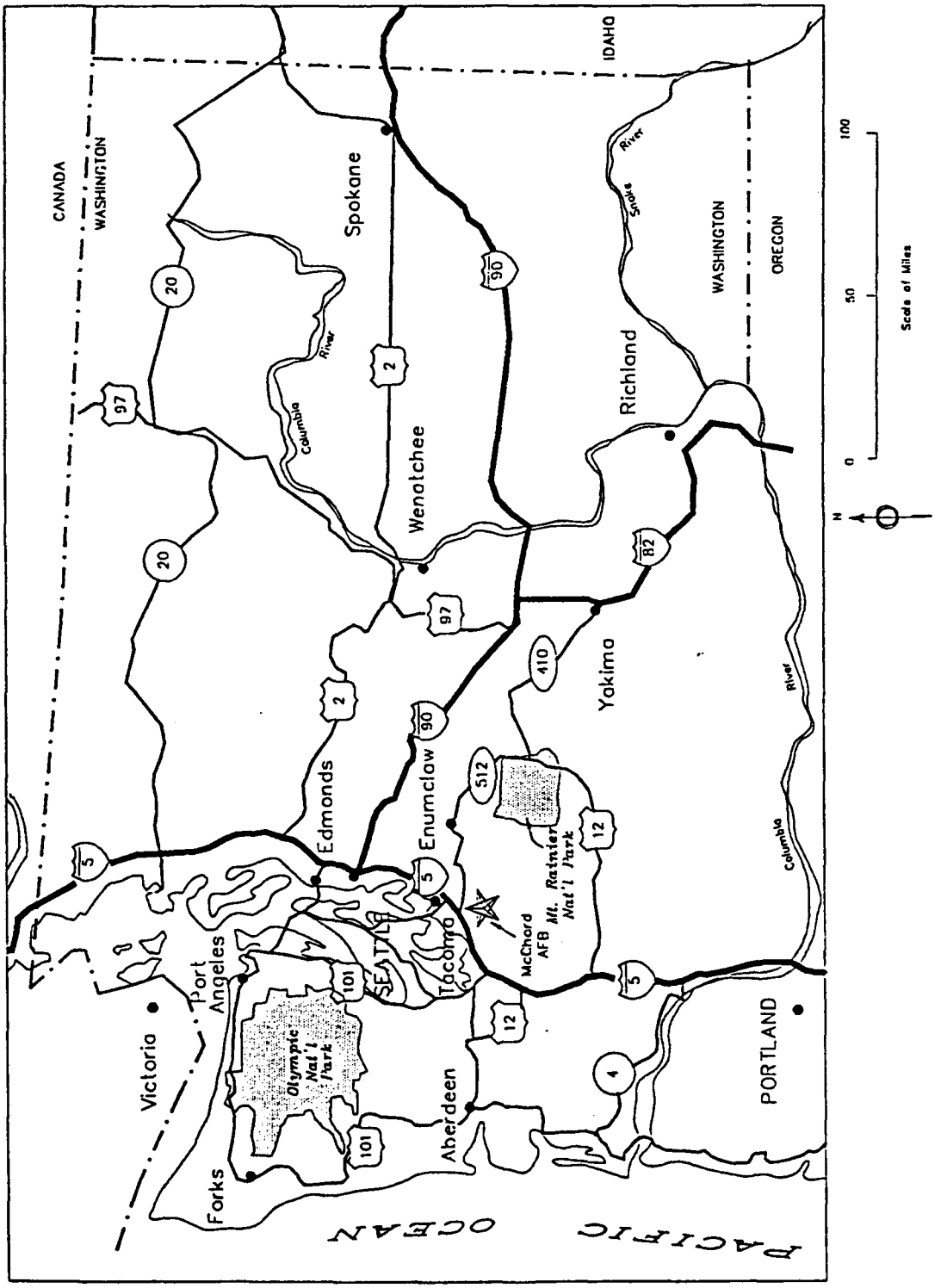

FIGURE 3.1 Map of Washington Showing Location of Tacoma and McChord AFB

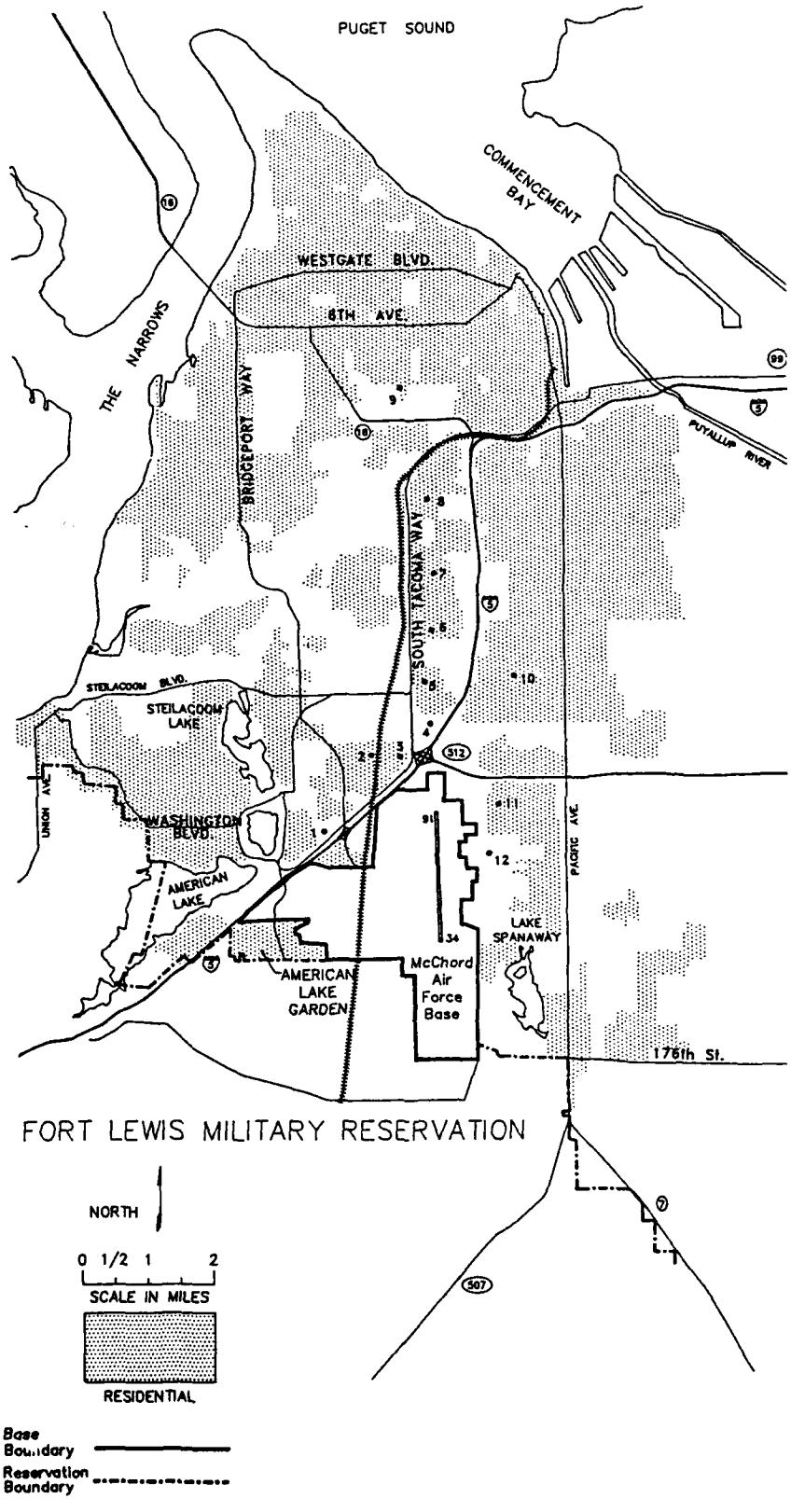

FIGURE 3.2 Regional Location and Residential Land Use in Vicinity of McChord AFB (numbered dots are locations of noise-sensitive receptors as listed in Table 3.1 and analyzed in Sec. 3.2.2.

TABLE 3.1 Descriptions of Individual Noise-Sensitive Locations near McChord AFB Selected for Noise-Impact Analysis

Location[a]	Description
1	Tyee Park Elementary School
2	Southgate Elementary School
3	Residential Area No. 1
4	Residential Area No. 2
5	Oakwood Elementary School
6	Arlington Elementary School
7	Gray Middle School and Edison High School
8	Madison Elementary School
9	Humana Hospital
10	Baker Junior High School
11	Sales Elementary School
12	Keithley Middle School and Washington High School

[a]Locations are indicated by numbered dots in all figures showing noise contours.

In December 1940, the 62nd Troop Carrier Group was formed and supported action on many fronts during World War II. After the Japanese surrender in 1945, the 62nd was deactivated; however, in September 1946 it was reactivated at Bergstrom AFB, Texas. In August 1947, the 62nd assumed command of McChord AFB. From that time until the Korean hostilities, the 62nd's history was marked with humanitarian and disaster aid missions. Before the Korean conflict, the 62nd was redesignated as the 62nd Troop Carrier Wing (Heavy) and later participated in the Korean airlift. In 1957, the 62nd was reassigned from control of the Tactical Air Command and placed under the Military Air Transport Service (now the Military Airlift Command) at Larson AFB. In 1960, the wing moved from Larson AFB back to McChord AFB as a tenant unit of the smaller 325th Fighter Wing. In 1965, the unit was renamed the 62nd Air Transport Wing (Heavy).

On January 1, 1966, the 62nd was designated as it stands today -- the 62nd Military Airlift Wing (MAW). On July 1, 1968, the 62nd took over command of McChord AFB from the 325th Fighter Wing.

The primary mission of McChord AFB is that of the 62nd MAW, which provides for the airlift of troops, equipment, passengers, and mail during peacetime or wartime. Secondary missions include those of the several tenant units stationed at the base. Among those are the recently deactivated 318th FIS and the 446th MAW, the Reserve Associate unit. The principal mission of the 318th was the strategic defense role of intercepting, identifying, reporting on, and (if necessary) employing conventional air-to-air munitions to attack and destroy hostile targets. The primary mission of the 446th MAW is to provide command and staff supervision, along with certain support functions with assigned units. The airlift squadrons under this wing perform peacetime missions as an adjunct to or as a corollary of training. Additionally, these squadrons are prepared to be the initial and primary source of augmentation of active forces requiring a rapid and substantial expansion. Other tenant units at McChord AFB include the 25th North American Aerospace Defense Command; 1905th Communications Squadron;

Detachment 11 of the 17th Weather Squadron; Detachment 11 of the 1369th Photographic Squadron; Field Training Detachment 502; and the 36th, 52nd, 62nd, and 86th Aerial Port Squadrons.

3.2 ENVIRONMENTAL SETTING

3.2.1 Air Quality

Air quality standards in the state of Washington are regulated by the Washington Department of Ecology in Olympia, and the Puget Sound Air Pollution Authority is responsible for air quality enforcement in the Seattle-Tacoma area. The Washington Department of Ecology establishes state air quality standards, sets performance standards for point sources of air pollutant emissions, and establishes programs for control of pollutant emissions. The state of Washington standards are equal to or more restrictive than the national secondary standards. Ambient air quality standards for the state, as well as national primary and secondary standards, are compared with ambient levels in the McChord AFB area in Table 3.2. The primary standard is required to protect public health with an adequate margin of safety. Secondary standards are set to protect the public welfare. Welfare, in this context, relates to damage to buildings, plants, and animals, as well as impairment of visibility.

Since there are no air quality monitoring stations at McChord AFB, ambient pollutant levels measured at other nearby stations were selected for purposes of this assessment. Table 3.2 identifies the most representative nearby stations to the base and lists the 1987 ambient pollutant levels measured at those stations. The representative stations were selected on the basis of discussions with the Washington Department of Ecology (Krug 1989). The basis for selection of the air monitoring stations was to pick locations with air quality conditions similar to those at McChord AFB (similar types of sources in the area) or locations with air pollutant concentrations higher than those at McChord AFB (thus providing a conservative measure of conditions at the base).

TABLE 3.2 National and State Ambient Air Quality Standards and Estimated Ambient Pollutant Levels in Vicinity of McChord AFB

Pollutant	Averaging Time	Standards			Ambient Level
		National			
		Primary	Secondary	Washington	
PM_{10} ($\mu g/m^3$)	Annual	50	50	50	43[a]
	24 hours	260	150	150	101
Total suspended particulates ($\mu g/m^3$)	Annual	75	60	60	57[b]
	24 hours	260	150	150	
Sulfur dioxide (ppm)[e]	Annual	0.03	-[c]	0.02	<0.01[d]
	24 hours	0.14	-[c]	0.1	0.01
	3 hours	-[c]	0.50	-[c]	0.02
	1 hour	-[c]	-[c]	0.4	0.02
Carbon monoxide[f] (mg/m^3)	8 hours	10	10	10	-[g]
	1 hour	40	40	40	-[g]
Nitrogen dioxide ($\mu g/m^3$)	Annual	100	100	100	-[h]

[a]Monitor located in town of Kent, at James and Central Streets, annual mean, 24-hour maximum.

[b]Monitor located at Auburn Health Department in town of Auburn.

[c]No standard set.

[d]Annual mean, 24-hour maximum, 3-hour maximum, 1-hour maximum at Mt. Tahoma High School in Tacoma.

[e]1 ppm is equivalent to 2,600 $\mu g/m^3$.

[f]The 8-hour limit of 10 mg/m^3 is equivalent to 9 ppm or 10,000 $\mu g/m^3$. The 1-hour limit of 40 mg/m^3 is equivalent to 35 ppm or 40,000 $\mu g/m^3$.

[g]Nearest monitoring locations are not representative of the McChord AFB area and reveal levels that exceed standards.

[h]Between 4 and 5 years ago, levels were approximately 20 $\mu g/m^3$. No monitoring has been carried out since then because levels were so low and nitrogen oxide sources remain few in number.

Source: Washington Department of Ecology 1988.

The assumed similarity in air quality between the locations of the Kent and Auburn monitoring stations and McChord AFB was based on the similarity of pollutant sources in the vicinity of those monitoring sites to the kinds of sources in the vicinity of McChord AFB. For the Mt. Tahoma High School monitoring location, sources in the vicinity of this residential/industrial area are different from the sources in the McChord AFB area. However, the Mt. Tahoma school monitoring location is the closest one to McChord AFB and is expected to have higher sulfur dioxide (SO_2) values than occur at McChord AFB (Krug 1989). The number of air monitoring devices placed at each monitoring station generally depends upon the types of pollutant sources in the local area. Not all criteria pollutants are measured at each monitoring site. The monitor for particulate matter with a diameter equal to or less than 10 μm (PM_{10}) in Kent is located 33 km northeast of McChord AFB. The Auburn monitor for total suspended particulates (TSP) is located 30 km northeast of McChord AFB, and the SO_2 monitor at Mt. Tahoma High School in south-central Tacoma is located 13 km north of McChord AFB.

The nearest nonattainment area (area not achieving standards) is for carbon monoxide (CO) and ozone (O_3) in metropolitan Tacoma. The nonattainment status there is due principally to automobile traffic in the metropolitan area and the pervasive use of wood-burning stoves. Activities at McChord AFB are only insignificant contributors to those conditions (Krug 1990). In fact, based on Pierce County emissions for 1988 (Hayes 1990), McChord AFB aircraft emissions amount to 0.47% of the county's CO emissions, 1.7% for hydrocarbons (HC), 1% for NO_x, 0.03% for TSP, and 0.43% for SO_2.

There are 99 air emission sources on McChord AFB maintained in accordance with a permit granted by the Puget Sound Air Pollution Control Agency. The effect of the 99 sources on McChord AFB air quality is negligible (Krug 1989).

The closest major off-site point sources of air pollution to McChord AFB are the emissions at Fort Lewis (especially the new incinerator there), located 11 km from the base; the wood-fueled boiler at Boise Cascade Co., 8 km from the base; the Woodworth &

Co. gravel pit operation, 3 km from the base; and the Spodoni Asphalt Co., 20 km from the base.

3.2.2 Noise

General

The major sources of noise at McChord AFB are the flight operations of assigned and transient military aircraft. As of March 1989, three military organizations flew aircraft and performed ground maintenance operations on aircraft at McChord AFB: 62nd MAW, 446th MAW (AFRES), and 318th FIS. At that time, there were 8 C-130E, 34 C-141, 16 F-15A, and 2 F-15B PAA aircraft assigned to units at McChord AFB. Transient aircraft operations include all types of military aircraft, as well as B-707, B-747, DC-10, L-188, L-382, and MU-2 civil aircraft. Military aircraft routinely operate in the local area making practice approaches, as well as full-stop landings. The civil aircraft complete only takeoffs and landings. This combination of assigned aircraft plus transient aircraft constitutes the *baseline* conditions for purposes of this assessment. As of the first quarter of FY 1990, only the 34 C-141 aircraft were assigned to McChord AFB.

During 1988, Runways 16 and 34 were used for 25% and 75%, respectively, of all flight operations. The prevailing winds are from the north. Runway 34 is the preferred runway because of traffic flow, flight safety, and noise considerations. At night, after 11:00 p.m., departures are directed to Runway 16, wind permitting, and arrivals to Runway 34. Flight safety requires that aircraft land and take off into the wind.

Frequency of Flight Operations and Ground Tracks

Table 3.3 summarizes the baseline aircraft flight operations at McChord AFB as of March 1989. Table B.1 lists the average daily number of fixed-wing aircraft flight

TABLE 3.3 Summary of Baseline *Average Busy Day* Aircraft Operations at McChord AFB[a]

Unit and Aircraft Type	Departures	Arrivals	Closed Patterns	Total Takeoffs	Total Landings	Total Operations
Assigned Military						
F-15	15.1/1.8[b]	15.1/1.8	16.5/1.8	31.6/3.6	31.6/3.6	63.2/7.2
C-130	2.41/0.41	2.41/0.41	5.70/1.12	8.11/1.53	8.11/1.53	16.22/3.06
C-141	13.15/0.31	13.15/0.31	34.42/0.80	47.57/1.11	47.57/1.11	95.14/2.22
Total Assigned						174.56/12.48 (187.04)[c]
Transient Military						
Fighter/Trainer	4.96/0.04	4.96/0.04	0.22/0	5.18/0.04	5.18/0.04	10.36/0.08
Cargo/Transport	10.86/2.32	10.86/2.32	0.23/0	11.09/2.32	11.09/2.32	22.18/4.64
Transient Civil[d]	2.04/0.97	2.04/0.97	0/0	2.04/0.97	2.04/0.97	4.08/1.94
Total Transient						43.28
Airport Total						211.18/19.14 (230.32)[c]

[a]Condensed from Table B.1 in Appendix B.

[b]Indicates day/night operations.

[c]Day plus night operations.

[d]Contractors.

operations by organizational category (assigned military, transient military, and transient civilian contractors) and, within each category, by aircraft type. No helicopter operations are routinely scheduled from McChord AFB. Some helicopter traffic does occur, but constitutes less than 1% of the total flights.

In modeling for noise impact, the USAF uses the *average busy day* concept, in which the day modeled represents a typical busy day of flying activities, as opposed to either an annual average (based on the total number of flight operations in a year divided by all 365 days in the year, i.e., including Saturdays, Sundays and holidays when, for most bases, activity is greatly reduced) or a worst-case (unusually busy) day. However, for a MAC unit such as the 62nd MAW, 365 flying days per year is realistic. The numbers of average daily flight operations listed in Table B.1 were obtained by dividing the total number of flight operations in 1988 by 365 flying days for assigned C-130 and C-141 aircraft; by 252 flying days per year for assigned F-15 aircraft; and by 350 flying days per year for all types of transient aircraft. It should be noted that 53% of the military flight operations during 1988 were performed in the closed patterns, as opposed to the departure and arrival tracks.

Ground-plane projections of the nominal flight tracks used by all aircraft traffic to and from McChord AFB are illustrated in Fig. 3.3. Aircraft may fly a closed pattern flight path for the purpose of aircrew training. These patterns are designed to permit the maximum takeoff, approach, and landing practice in the least amount of time. The pattern is essentially a rectangular path from takeoff back to landing. The landing may be either a full stop, a *touch and go* (a landing followed by an immediate takeoff), or a low approach (the aircraft is aligned with the runway but does not touch down before executing a transition to the takeoff phase). All but one of the closed patterns used at McChord AFB are flown on the east side of the base. The one pattern flown on the west overflies base property.

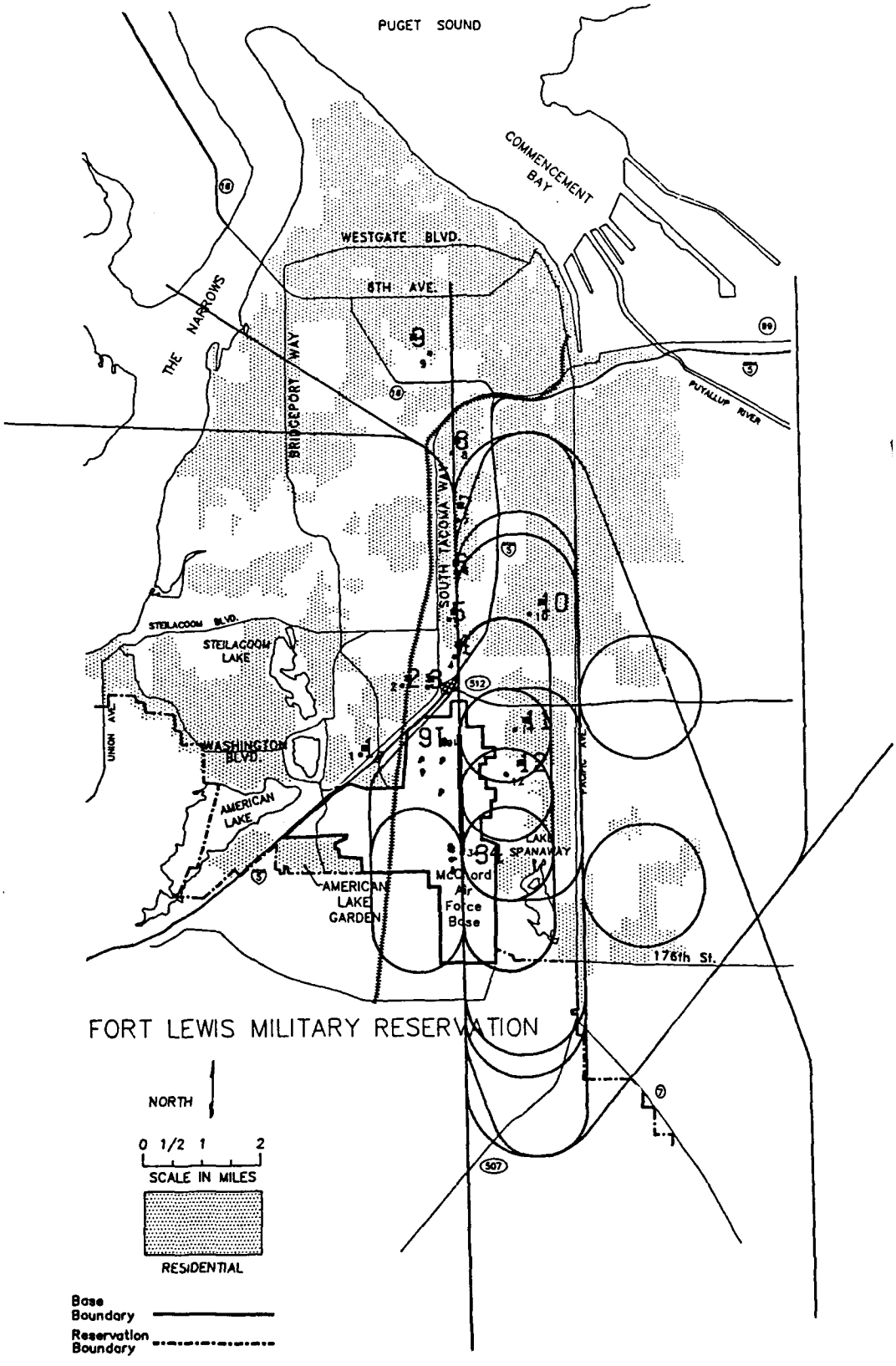

FIGURE 3.3 Ground-Plane Projections of Flight Paths (tracks) for All Baseline Flight Operations

Impacts of aircraft noise are of particular concern at the 12 numbered locations shown on Fig. 3.3 and on other figures presented later in this document that show noise contours around McChord AFB. These locations, consisting of the schools, hospitals, and residential areas closest to the northern end of the runway and near the flight path, were selected for specific analysis because of the noise-sensitive activities conducted there. (These locations were identified in Table 3.1 and are discussed further below in the subsection on *Noise-Level Contours.*)

Day-Night Average Sound Level

Computer modeling of aircraft noise was conducted by Argonne National Laboratory with data provided by McChord AFB personnel. The USAF NOISEMAP computer program (version 5.0) was used to prepare noise-level contours representing the baseline (1989) conditions at McChord AFB. The resulting noise exposure estimates are expressed in terms of the day-night average sound level (L_{dn}). This methodology takes into account the effect of each aircraft single event (acoustic emission of the operation, altitude, and air speed), the number of times each event occurs during the *average busy day*, and time of day that the event occurs. A daily L_{dn} is the 24-hour average sound level, in A-weighted decibels (dB), for the period from midnight to midnight, obtained after adding 10 dB to sound levels occurring during the night (from 10 p.m. to 7 a.m.).

The L_{dn}, as used in NOISEMAP, is calculated on an annual average basis using the *average busy day* concept. As an annual average, it is not tied to any specific 24-hour period. The NOISEMAP methodology uses the following flight data: aircraft type, altitude profiles, engine power settings vs. aircraft speed schedules, flight-track locations, number of operations per track, runway utilization schedules, and run-up (ground engine-testing) data. A more detailed description of the L_{dn} contour computation methodology is given in Appendix A.

Noise-Level Contours

The noise-level contours generated from the NOISEMAP model for the baseline flight activity at McChord AFB are shown in Fig. 3.4. These contours define the location of noise levels on and around the airfield at L_{dn} values of 65, 70, 75, 80, and 85 dB. The values on the noise contours can be interpreted to represent different levels of community annoyance, as listed in Table 3.4, and are often used as guidelines for zoning by local communities in the vicinity of military airfields.

The Air Force *Air Installation Compatible Use Zone (AICUZ) Handbook* (Department of the Air Force 1984) considers L_{dn} levels below 65 dB compatible with residential land use. Residential land use is discouraged for areas with noise levels in the range 65-70 dB on the L_{dn} scale, is strongly discouraged for areas in the 70-75 dB range, and is considered generally unacceptable for areas that exceed 75 dB. Table 3.5 lists the estimated numbers of residents and occupied housing units located within these L_{dn} zones around McChord AFB under the baseline conditions.

The L_{dn} contours in Fig. 3.4 represent the cumulative effect of all baseline aircraft activities. The L_{dn} values at 12 noise-sensitive community locations around McChord AFB, indicated by the numbered bold dots on all noise-level-contour figures, range from 60 to 77 dB, as tabulated in Table 3.6. These locations were selected for analysis of noise impacts because they are those residential areas, schools, and hospitals located closest to sources of noise from McChord AFB aircraft activities. Nine of the 12 locations are exposed to L_{dn} noise levels greater than 65 dB.

The size and shape of the contours shown in Fig. 3.4 for all operations combined may be better understood by examining separate sets of contours for each of the primary sources of aircraft noise at McChord AFB. Figures B.1 through B.3 in Appendix B illustrate the component contours for C-141, F-15, and transient flight operations, respectively. Figure B.4 illustrates the component contours for the ground run-up

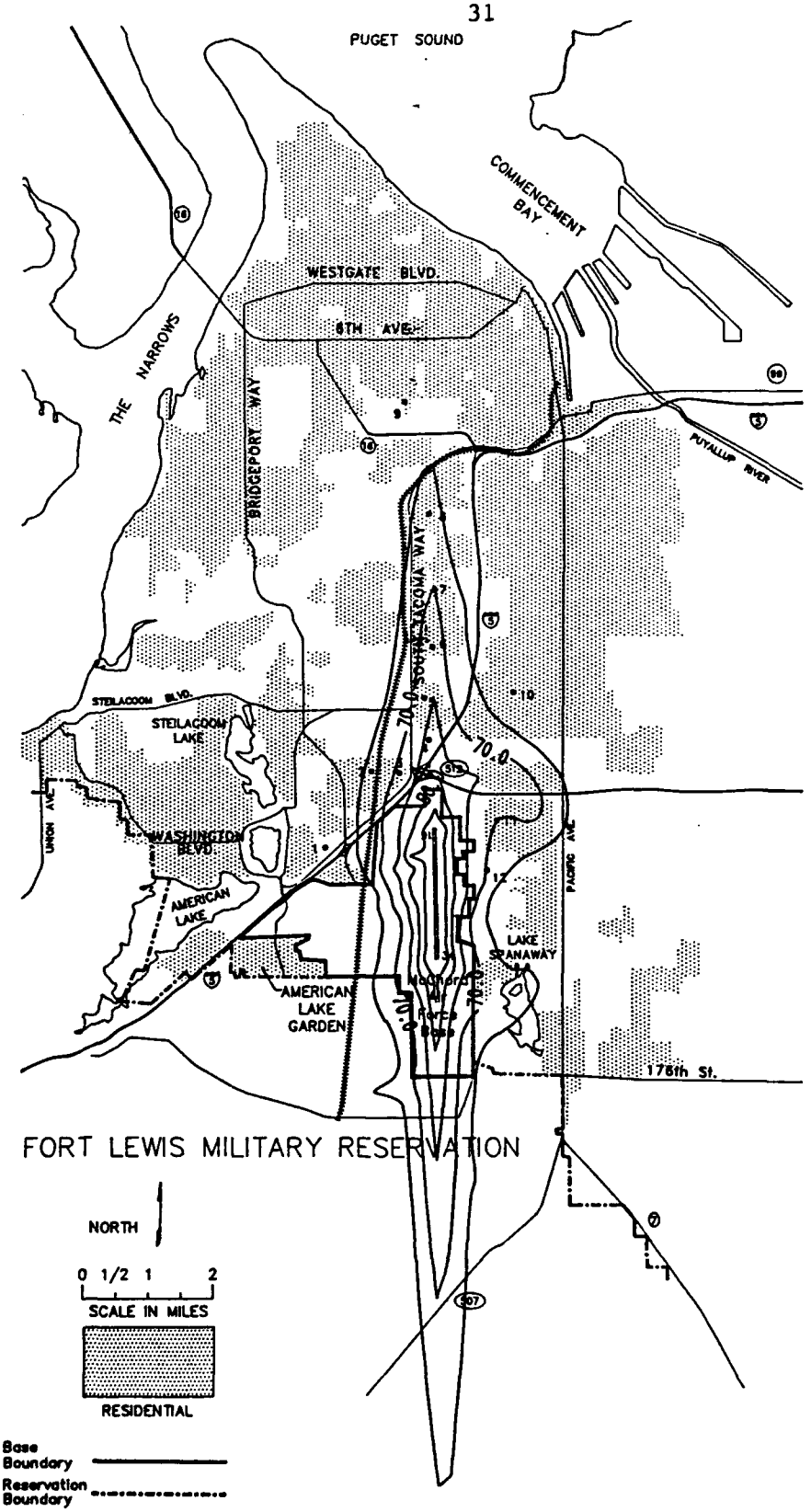

FIGURE 3.4 Baseline L_{dn} Contours for All Flight Operations

TABLE 3.4 Percentage of a Populated Community Highly Annoyed as a Function of Day-Night Average Sound Level (L_{dn})

L_{dn} (dB)	Percentage Highly Annoyed
45	1
50	2
55	5
60	9
65	15
70	25
75	37
80	53
85	73

Sources: Committe on Hearing Bioacoustics and Mechanics 1977; Schultz, 1978; EPA 1982.

TABLE 3.5 Comparative Numbers of Off-Site Residents and Occupied Housing Units Existing within L_{dn} Zones

L_{dn} Zone (dB)	Number of Residents	Number of Occupied Housing Units
65-70	17,807	7,752
70-75	9,349	3,902
75-80	2,440	1,109
80-85	36	15
>85	0	0

TABLE 3.6 Baseline L_{dn} Noise Levels at 12 Off-Site Community Locations near McChord AFB

Location[a]	Description	L_{dn} (dB)
1	Tyee Park Elementary School	60
2	Southgate Elementary School	67
3	Residential Area No. 1	71
4	Residential Area No. 2	77
5	Oakwood Elementary School	74
6	Arlington Elementary School	73
7	Gray Middle School and Edison High School	69
8	Madison Elementary School	67
9	Humana Hospital	54
10	Baker Junior High School	59
11	Sales Elementary School	71
12	Keithley Middle School and Washington High School	68

[a]Locations are indicated in all figures showing noise contours.

operations. The component contour figures collectively indicate that F-15 flight operations produce the greatest noise impact on the community, followed by transient aircraft, C-141 aircraft, and ground run-up operations, in that order. Operations by C-130 aircraft do not generate enough noise to warrant separate presentation.

Single-Event Analysis

Table 3.7 lists the calculated noisiest flight operation for each type of assigned aircraft at each of the selected noise-sensitive locations. The results characterize the worst-case, short-term impact and contribution to L_{dn} of a particular aircraft's operations at the designated location and can be caused by either an approach or a departure. The term *maximum contribution to average level* refers to the greatest value of L_{dn} contribution computed for each of the aircraft operations under consideration at a particular location; i.e., the *maximum* L_{dn} that would result if each specific operation listed was the only source of noise.

The results of these computations (listed in Table 3.7) for the assigned C-130, C-141, and F-15 aircraft indicate that single-event levels range from as low as 18-dB contribution to L_{dn} at Tyee Park School for C-130 departures to as high as 68-dB contribution to L_{dn} at residential areas 1 and 2 for F-15 departures. At all locations, F-15 departures contribute at least 5 dB more to L_{dn} than any other aircraft operations.

Noise-Abatement Procedures

McChord AFB has instituted several noise-abatement procedures for flight operations to reduce community noise impacts. These procedures are summarized as follows:

- No training or practice flights of assigned aircraft are normally permitted between 11 p.m. and 6 a.m.

TABLE 3.7 Maximum Contributions to Average Level (L_{dn}) at Community Locations near McChord AFB from Individual Aircraft Operations

Location[a]	Description	Cumulative L_{dn}[b]	Maximum Contributions to Day-Night Level (L_{dn}) in dB[c]					
			C-130		C-141		F-15	
			Depart.	Appro.	Depart.	Appro.	Depart.	Appro.
1	Tyee Park Elem. School	60	18	26	38	44	56	29
2	Southgate Elem. School	67	30	23	49	38	63	34
3	Residential Area No. 1	71	40	33	54	45	68	39
4	Residential Area No. 2	72	52	46	55	63	68	46
5	Oakwood Elem. School	74	46	43	53	60	66	44
6	Arlington Elem. School	73	41	41	53	58	64	45
7	Gray Middle School and Edison High School	69	38	37	52	54	62	44
8	Madison Elem. School	67	35	36	47	52	59	45
9	Humana Hospital	54	25	29	37	37	50	38
10	Baker Jr. High School	59	28	20	41	29	56	36
11	Sales Elem. School	71	24	14	46	26	61	41
12	Keithley Middle School, Washington High School	68	24	19	46	31	62	37

[a]Locations are indicated by bold dots in all figures showing noise contours.

[b]From Table 3.6.

[c]Depart. = Departure; Appro. = Approach.

- Winds permitting, essential military takeoffs between 11 p.m. and 6 a.m. generally are to the south (Runway 16), and essential landings are to the north (Runway 34) to minimize noise impacts in Tacoma.
- Maintenance ground run-up testing normally is not permitted between 11 p.m. and 6 a.m.

Noise Complaints

Complaints regarding aircraft noise are handled by the 62nd MAW Public Affairs Office. Each complaint is documented on a complaint worksheet. Flight operations staff are consulted to determine the most likely category (assigned or transient) and type of aircraft involved. If initial investigation indicates that F-15 assigned aircraft are involved, the complaint is referred to the Public Affairs Office of the 25th Air Division (incorporating the 318th FIS) for further disposition. If it is not initially obvious that McChord AFB assigned or transient traffic is involved, the Public Affairs Office will contact other appropriate air bases to determine if the complaint factors can be correlated with any of their flight operations.

Upon completion of the internal investigation and determination of the most probable cause of the complaint, a personal response is made to the complainant. If the investigation reveals that the problem arose from transient aircraft or other aircraft passing through the region, the situation is explained to the complainant. All complaints and corresponding actions taken by McChord AFB personnel are documented in the noise complaint log. The Public Affairs Officer periodically reviews the noise complaint log to determine if any trends can be detected. Apparent trends are reviewed with the Deputy Commander for Operations.

McChord AFB receives an average of nine noise complaints per month, with about 80% attributable to assigned aircraft. Of these, in 1988 approximately 48% of the complaints were found to be related to assigned F-15 aircraft operations, and 32% were attributable to assigned C-130 and C-141 aircraft operations.

3.2.3 Waste Management and Hazardous Materials

Sanitary and Industrial Wastewater

All domestic and most industrial sewage generated at McChord AFB is transported through sewer lines to the Fort Lewis wastewater treatment facility. After treatment, effluent from that facility is discharged into Puget Sound. Aircraft hangar and maintenance bay washdown wastes and flightline stormwater runoff are treated in oil/water separators. Water from some of the separator systems is sent to drain fields and percolation pits, where the treated water infiltrates into the soil. In selected instances, the discharge from the oil/water separators is discharged directly to Clover Creek in accordance with National Pollution Discharge Elimination System permit requirements. The base currently submits reports on water quality at regular intervals and is in compliance with permit requirements. Nonhazardous solid wastes generated at McChord AFB are disposed of in a sanitary landfill at Fort Lewis.

Storage and Handling of Hazardous Materials

A number of potentially hazardous materials are used, stored, or have been consumed at the base. These hazardous materials are handled in accordance with federal, state, and local regulations and standards. Operations involving the use or disposal of hazardous materials or waste at the MAC facility include maintenance of aircraft, aerospace ground equipment, and ground vehicles; and management and distribution of petroleum, oil, and lubricants. Examples of these materials include waste oils; recovered fuels; spent cleaners; paint removers, thinners, and strippers; and cleaning solvents. JP-4 jet fuel is the most plentiful hazardous material on the base. Some wastes are turned in to base supply for recovery, but most are disposed of through the Defense Reutilization and Marketing Office.

Collection and Disposal of Hazardous Wastes

McChord AFB has implemented a hazardous materials and dangerous waste management plan (Department of the Air Force 1985) that details methods for containment, storage, packaging, visual inspection, preventative maintenance, housekeeping, material compatibility, security, monitoring, handling, transporting, and disposing of hazardous wastes. The plan is based on regulations promulgated by the USAF and other federal and state agencies.

Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Public Law 96-510), as amended, the DOD has initiated an Installation Restoration Program (IRP) to investigate any environmental contamination present at DOD facilities as a result of past waste-disposal activities. A preliminary assessment and site investigation have been completed at McChord AFB (Department of the Air Force 1986). The IRP findings confirmed the presence of groundwater contamination from past activities at McChord AFB.

Fuel was found floating on the water table west and north of the liquid-fuel bulk-storage tanks. This area will be cleaned, and further investigations have shown no present discharges to groundwater. Mixed leaded gasoline, diesel fuel, and chlorinated solvents were found beneath the industrial operations and washracks adjacent to MAC C and D ramps. The IRP study recommends that a fuel-recovery system be installed to remove this contamination, and that direct discharge to leach pits and dry wells should be discontinued. Soils west of Bldg. 307 and south of Bldg. 342 have been contaminated with aviation fuel and industrial solvents. In addition, the IRP investigation revealed that old landfills on the McChord AFB golf course have contaminated the groundwater.

The IRP activities at McChord AFB identified 62 sites. Of these sites, 42 are under investigation and 20 are being closed. The completion of the IRP process will close out the remaining sites at McChord AFB. It will not be necessary for the USAF to conduct additional IRP investigations and remedial actions related to the realignment.

3.2.4 Water Resources

Clover Creek, Morey Pond, and Morey Creek are the primary surface water features at McChord AFB. Morey Creek originates at Spanaway Lake east of the base and merges with Clover Creek at a marsh on the eastern portion of the base. Clover Creek has been extensively modified throughout its entire 10-mi length. It flows through pipes under the McChord AFB runway, and the creek bed has been straightened and diked throughout the remainder of its course through the base with the exception of the last 1,000 ft. Surface water quality is good, as indicated by the presence of trout populations both in Clover and Morey creeks. No salmon runs occur in these streams.

Several small ponds on the base provide recreational opportunities. In addition, several marshlands on the base provide surface water and groundwater recharge.

Groundwater is found at initial depths of 5-20 ft below the surface. Two major aquifers exist at McChord AFB. These aquifers are separated by a clay layer at a depth of 180 ft below the ground surface. Because soils consist primarily of glacial outwash, infiltration rates are high, and groundwater levels fluctuate as a function of seasonal rainfall amounts. The surface aquifer is susceptible to contamination because of the rapid infiltration rates (see Sec. 3.2.3). Water supply is provided by wells that range in depth from 140 to 550 ft below the surface.

Generally, the aquifers in Pierce County are susceptible to impacts of land disposal of waste. Groundwater quality upgradient of the primary USAF flightline activities is generally of good quality. Heavy metal concentrations are less than 0.5 mg/L, with minor organic compound contamination (JRB Assoc. 1984). Areas of

groundwater under the industrial locations at McChord AFB show evidence of past disposal activity (see Sec. 3.2.3). None of the eight production wells on McChord AFB is screened in the upper aquifer. Because the clay layer restricts contaminant movement from the upper aquifer to deeper aquifers, none of the production wells has been closed, and all wells meet applicable standards.

3.2.5 Vegetation and Wildlife Resources

The original vegetation occupying the site of McChord AFB consisted of tallgrass prairie with scattered stands of oak, ponderosa pine, and Douglas-fir. The prairie was maintained by periodic fires. Changes in land use patterns and the control of fires has resulted in a reduction of the tall grass prairie and an increase in the number of Douglas-fir stands. Approximately 900 acres of forest now occur on the base. Most of the remaining natural vegetation is located in the southern quarter of the base. Managed vegetation and landscaped areas dominate the industrial, community, and airfield portions of the base.

The forested and grassland areas provide habitat for red-tailed hawk, coyote, deer, bear, porcupine, raccoon, oppossum, and numerous small mammals and song-bird populations. McChord AFB wildlife populations benefit from the presence of large undeveloped areas on Fort Lewis, which borders the southern portion of McChord AFB. Several marshlands on McChord AFB provide habitat for waterfowl. The marshlands do not support extensive fish populations.

3.2.6 Threatened and Endangered Species

Although the bald eagle is found within the region that contains McChord AFB, its occurrence on the base has not been confirmed. Any eagles sighted on the base would most likely be residents of the large undeveloped areas on Fort Lewis. McChord AFB supports populations of state-protected squirrels and sea gulls. The range of two state-

protected plant species -- the giant trillium and the white-topped aster -- includes the McChord AFB area, but the presence of those species on the base has not been confirmed. No formal survey for federal threatened and endangered species has been conducted on the base.

3.2.7 Socioeconomics

McChord AFB is located on the southern edge of the city of Tacoma in Pierce County. The city had an estimated 1986 population of 158,950 people. This represented an increase of less than 1% from the 1980 population of 158,501. A small rate of increase (2.7%) also was experienced from 1970 to 1980. With an area of 47.7 mi^2, Tacoma had a population density of about 3,332 people/mi^2 in both 1980 and 1986 (U.S. Bureau of the Census 1983, 1987).

No other large cities occur in the immediate vicinity of McChord AFB, but the unincorporated towns of Lakewood, Tillicum, Ponders, Brookdale, Spanaway, Parkland, and Steilacoom are located around the base. These towns are part of the suburban Tacoma area.

Pierce County occupies 1,675 mi^2 and consists primarily of urban and suburban development, with remaining pockets of forest and agricultural land located along Puget Sound and in the eastern portion of the county. The 1985 county population was 523,500, a 7.8% increase from 1980 (U.S. Bureau of the Census 1983, 1986). This rate of growth was slightly greater than that experienced by the state of Washington as a whole. The population density of the county was about 313 people/mi^2 in 1985.

Civilian employment in Pierce County exceeded 181,000 in 1981 (U.S. Bureau of the Census 1983). Employment at McChord AFB is 5,271 military and 2,543 civilian personnel. Total annual payroll at McChord AFB is estimated at $166.5 million (Department of the Air Force 1988a).

3.2.8 Cultural Resources

In the area within and adjacent to McChord AFB, there is evidence of a number of homesteads/farmsteads that were in use before the purchase of the land in 1919 for Fort Lewis (Pittman 1989). An historic farmstead was located near what is now the eastern edge of the base; however, the site is so disturbed that the exact location has yet to be determined. These homesteads/farmsteads are not in areas to be affected by the proposed action. A number of historic buildings constructed prior to 1939 also occur in the area, but only one of these (Hangar 1, constructed in 1938) would be affected by the proposed action. None of these sites or structures is listed in the *National Register of Historic Places* (NRHP). A cultural resource survey was conducted in 1987 at McChord AFB by the National Park Service (NPS) (Pittman 1989; Calliott 1989). The survey uncovered no archaeological sites and one potential National Register structure (Hangar 1) in the area of proposed action (Rodeffer 1989). However, Hangar 1 has since been determined by the State Historic Preservation Office (SHPO) to be ineligible for the NRHP (Hansen 1989).

3.2.9 Land Use

The Fort Lewis Military Reservation is located along the southern boundary of McChord AFB. The areas to the north, east, and northwest of the base are zoned for commercial, residential, and light industrial uses. Commercial strip development has occurred in locations next to the base near Interstate 5, along the eastern border of the base, and along Highway 512 at the northern border. The American Lake Garden Tract is a privately owned area of approximately 340 acres between the boundaries of McChord AFB and Fort Lewis at the southwestern corner of McChord AFB.

The Burlington Northern Railroad right-of-way divides the base into eastern and western sections. The western portion of the base contains the 25th Air Division, the 800 Area ammo storage and explosive safety clear distances, family housing, a golf

course, and other recreational areas. The eastern area of the base includes all aircraft mobilization and maintenance facilities. In addition, almost all administrative and support functions are located on the eastern portion of the base. Although no agricultural activity occurs on McChord AFB, past forest management practices have included the harvest of forest products. The primary undeveloped portion of McChord AFB is south of the runway along the border with Fort Lewis.

The Air Installation Compatible Use Zone (AICUZ) Program is a Department of Defense concept designed to promote compatible land use in nongovernment areas around military airfields. The objective is to protect nearby civilian residents from aircraft noise and safety hazards and preserve the operational integrity of the installations. Individual AICUZ Study reports are generally required for Air Force installations with a flying mission. The AICUZ area of influence for an installation consists of land areas on which certain uses may obstruct the airspace or otherwise be hazardous to aircraft operations, and land areas exposed to aircraft operations that affect public health, safety, or welfare. In addition to the noise zones (NZs) defined by the L_{dn} contours for a particular installation, the USAF determines clear zones (CZs) and accident potential zones (APZs) for each active runway at an installation. Land use compatibility with NZs, CZs, and APZs around McChord AFB are detailed in the most recently issued AICUZ study for the base (Department of the Air Force 1976), prepared in accordance with the Air Force's *AICUZ Handbook*. The criteria in the study are intended to assist local planning boards minimize impacts to the local population. However, neither Pierce County nor the City of Tacoma has implemented any of the land use recommendations in that report.

Nearly all studies on residential aircraft noise compatibility recommend that there be no residential uses in noise zones above L_{dn} 75 or its equivalent in other noise descriptor systems (Department of the Air Force 1988b). Usually no restrictions are recommended for areas below L_{dn} 65. Between L_{dn} 65 and 75, there currently is no

consensus. These areas may not qualify for federal mortgage insurance in residential categories according to HUD Regulation 24 CFR 51B. In many cases, HUD approval requires noise attenuation measures, the Regional Administrator's concurrence, and an environmental impact statement. Past USAF experience and lack of definitive criteria do not justify a recommendation to categorically prohibit residential uses in these areas, although these uses will often be quite undesirable. However, whenever possible, residential use should be in locations having noise levels below L_{dn} 65 (Department of the Air Force 1988b).

Most industrial/manufacturing uses are compatible in the airfield environs. Exceptions are such uses as research or scientific activities that require lower noise levels. Noise attenuation measures are recommended for portions of buildings devoted to office use, receiving the public, or where the normal background noise level is low. The transportation, communications, and utilities categories have a high noise level compatibility because they generally are not people-intensive. When people use land for these purposes, the use is generally very short in duration. Where buildings are required for these uses, additional evaluation is warranted (Department of the Air Force 1988b).

The uses of land for commercial/retail trade and personal and business services categories are compatible without restriction up to noise levels of L_{dn} 70; however, they are generally incompatible with levels above L_{dn} 80. Between L_{dn} 70 and 80, noise-level reduction measures should be included in the design and construction of buildings. The nature of most uses in the public and quasi-public services category requires a quieter environment, and attempts should be made to locate these uses in areas with levels below L_{dn} 65, or to provide adequate noise-level reduction.

Although recreational use has often been recommended as compatible with high noise levels, recent research has resulted in a more conservative view. Above L_{dn} 75, noise becomes a factor that limits the ability to enjoy such uses. Where the requirement to hear is a function of the use (e.g., music shells), compatibility is limited. With the

exception of forestry activities and livestock farming, uses in the categories of resource production, extraction, and open space are compatible, almost without restrictions (Department of the Air Force 1988b).

3.2.10 Land Traffic

The primary entrance into McChord AFB is Bridgeport Way, which accesses Interstate 5 at a major interchange and is an arterial street serving the main gate entrance to the base, the Lakewood vicinity, and other areas to the west and northwest of the base. Interstate 5 is the north-south freeway between the Mexican and Canadian borders. Other gates into McChord AFB are located on South Tacoma Way (North Gate), Lincoln Boulevard (Family Housing Gate), and near Spanaway Loop Road (East Gate).

3.2.11 Airspace

Low-altitude training requirements have been satisfied on routes within eastern Washington for a number of years. Much of this low-altitude flying ends in the Larson drop zone in Grant County. These training routes have been used by both C-130 and C-141 aircraft. With the deactivation of the final eight C-130 PAA aircraft in the 36th TAS in 1989, there has been a decrease in use of the low-altitude routes.

Past C-141 low-altitude training has been at 300 ft above ground level (AGL) and has occurred about 8 days a month -- 2 missions per day, 2 days a week, 2 weeks per month. Flights are in the daytime and are usually in a three-ship formation.

Unit aircraft also practice approaches at a number of locations in the state, including Grant County Airport at Moses Lake, the municipal airport at Yakima, Gray Field at Fort Lewis, Whidbey Island Naval Air Station, and, less often, Seattle-Tacoma Airport as traffic allows.

The 318th FIS is totally dependent on airspace developed and scheduled by the U.S. Navy. Air superiority training by the F-15 is conducted in the Roosevelt, Olympic

A/B, and Okanogan Military Operations Areas (MOAs). Live fire and other related activities are conducted in Warning Areas 237 A/B and 570. Military training routes and restricted areas are not used.

3.2.12 Flight Safety

As is the case for all USAF bases, McChord AFB conducts an extremely comprehensive flying safety program. Every aspect of flying and aircraft maintenance is governed by safety considerations to avoid the loss of life and property. Every precaution is taken to ensure the airworthiness of each aircraft, the flying proficiency of the aircrews, and safe airborne operations.

No special flying safety requirements or procedures are needed at McChord AFB. The air traffic controllers at the McChord AFB tower and personnel at the Federal Aviation Administration's air traffic control operation in Seattle have the responsibility to control and ensure the safe operation of the aircraft in this area.

4 ENVIRONMENTAL CONSEQUENCES OF THE ACTIONS

4.1 DIRECT AND INDIRECT CONSEQUENCES OF THE ACTIONS

4.1.1 Air Quality

To assess potential impacts on air quality, air pollutant emissions were computed for the baseline scenario (conditions as of March 1989) and a future (1990) scenario. For the 1990 scenario, emissions expected after the removal of the F-15 and C-130 aircraft and the increase in the number of C-141 aircraft at McChord AFB were compared with 1989 emissions to evaluate the potential impacts of the action. Military Airlift Command personnel estimated that there would be a daily average of about 18 landing-takeoffs and 47 closed patterns for the assigned C-141 aircraft, with 365 flying days per year.

Based on the information on number of landing-takeoffs and touch-and-goes for each military aircraft, the annual emission totals were calculated for each of the criteria pollutants. Seitchek (1985) provides information on pollutant emissions for specific engine types in various operating modes and includes tables that indicate the estimated emissions for a typical landing-takeoff cycle and a typical touch-and-go operation. These estimates are based on the average time in various operating modes for each cycle. Estimates of annual emissions for aircraft flight activities were based on the data and methods described by Seitchek (1985), along with the operational data given in Table 3.3 for all assigned and transient aircraft. In summary, emissions for each touch-and-go and landing-takeoff were multiplied by the number of such flights in a typical busy day, and that quantity was multiplied by the number of flying days in the year.

Table 4.1 shows that compared with baseline conditions, the 1990 case of removal of F-15 and C-130 aircraft and the increase in C-141 aircraft would reduce

TABLE 4.1 Comparison of Baseline Aircraft Emission Levels (1989) with Emission Levels Expected after Removal of F-15 and C-130 Aircraft and Increase of C-141 Aircraft in 1990

Source	Emissions (metric tons per year)				
	CO	HC	NO_x	TSP	SO_2
Baseline Conditions (1989)					
Assigned Military					
C-141	529.0	400.6	100.1	7.8	15.9
C-130	55.6	34.6	13.7	1.9	2.5
F-15	67.8	8.1	43.9	1.3	7.3
Transients	448.5	302.9	62.3	5.7	11.0
Total	1,100.9	746.2	220.0	16.7	36.7
Proposed Conditions (1990)					
Assigned Military (C-141)	705.1	533.9	133.4	10.4	21.2
Transients	448.5	302.9	62.3	5.7	11.0
Total	1,153.6	836.8	195.7	16.1	32.2
Percentage change from baseline conditions (%)	+4.8	+12	-11	-3.6	-12
State of Washington emission totals (1985)	2,676,935	-	288,986	219,393	193,101
McChord 1990 percentage of state 1985 total (%)	0.04	-	0.06	<0.01	0.02

emissions of nitrogen oxides (NO_x), total suspended particulates (TSP), and sulfur dioxide (SO_2), but would increase emissions of carbon monoxide (CO) and hydrocarbons (HC).

To estimate the impact on air quality at the base boundary from the projected emissions of CO, SO_2, TSP, NO_x, additional air quality analyses were carried out using the methods in Seitchek (1985).

For the 1990 scenario, the impact of the full squadron of C-141 aircraft was estimated by examining the worst hour of the day for air emissions (between 10 a.m. and 11 a.m.). That hour would include an average of 1.25 departures, 1.875 arrivals, and 6.6 closed patterns by the C-141 aircraft; and an equivalent of 1.12 takeoffs and 1.12 landings by transient aircraft (also represented by C-141 aircraft). Conservative meteorological conditions (F atmospheric stability class, 1 m/s wind speed) were used in calculating the predicted pollutant concentration increments listed in Table 4.2. Estimates of 3-hour and 24-hour concentrations were made using correlations found in Seitchek (1985). Annual average levels would be less than the maximum 24-hour prediction. The increments in Table 4.2 from the C-141 aircraft and transients are small and are only a small fraction of the air quality standards. The addition of existing air pollutant levels to these increments leads to concentrations that are well within the air quality standards. It should be noted once again that the ambient concentrations of carbon monoxide at the monitoring locations nearest the base exceed the state standards, even though the locations are not considered representative of the conditions at McChord AFB.

The McChord AFB aircraft emissions for the proposed conditions would be only very small fractions of Pierce County emission totals for 1988 (as provided by Hayes 1990). These aircraft emissions would amount to only 0.5% of the county's CO emissions, 2% for HC, 0.93% for NO_x, 0.03% for TSP, and 0.29% for SO_2.

TABLE 4.2 Predicted Increases in Ambient Pollutant Levels at the McChord AFB Boundary due to the Operations of C-141 and Military Transient Aircraft in 1990

Pollutant	Averaging Time	Applicable Federal or State Standard[a]	Ambient Level	Proposed Scenario	
				Maximum Contribution	Maximum Total
Total suspended particulates ($\mu g/m^3$)	Annual	60	-	-	-
	24 hours	150	57[b]	0.379	57.379
Sulfur dioxide[c] ($\mu g/m^3$)	Annual	53	<26		
	24 hours	260	26	0.649	26.649
	3 hours	1,300	52	0.455	52.455
	1 hour	1,040	52	1.114	53.114
Carbon monoxide (mg/m^3)	8 hours	10	-	0.035	-
	1 hour	40	-	0.05	-
Nitrogen dioxide ($\mu g/m^3$)	Annual	100	-[d]	5.137	-

[a]The more stringent of the federal or state standards is listed here. As seen in Table 3.2, the state and federal standards are often identical, but when they are different, the state standard must be more restrictive.

[b]Monitor located at Auburn Health Department in Auburn.

[c]Annual mean, 24-hour maximum, 3-hour maximum ambient levels are those recorded at Mt. Tahoma High School monitor in Tacoma.

[d]Four to five years ago levels were approximately 20 $\mu g/m^3$. No monitoring has been carried out since then because levels were so low and NO_x sources remain few in number.

The increase in hydrocarbons from 746 to 837 metric tons per year would have some effect on the production of ozone in the area. However, an annual increase of 91 metric tons is very small compared with regional releases, and the decrease in NO_x from 220 to 196 metric tons per year would help counteract the effect of increased hydrocarbon emissions.

Various construction activities associated with the proposed action would cause short-term emissions of small amounts of fugitive dust at McChord AFB. With implementation of appropriate control measures (such as periodic watering or application of chemical dust suppressants), the concentration of total suspended particulates at the base boundary would be only minimally elevated. Measures to minimize fugitive dust generation would be incorporated into the requirements of the contracts for construction activities.

4.1.2 Noise

Frequency of Flight Operations and Ground Tracks

With deactivation of the 36th TAS and the 318th FIS, all of the F-15 and C-130 aircraft assigned to these units have been reassigned to units located at other bases before the arrival of the C-141 aircraft being reassigned to McChord AFB as a result of the closure of Norton AFB. In combination with the proposed transfer of two additional C-141 aircraft from Travis AFB, this would increase the number of C-141 aircraft to 48 from the baseline level of 34 and reduce the numbers of F-15 and C-130 aircraft to 0 from the baseline levels of 18 and 8, respectively (all figures are PAA). It is assumed that transient operations would remain unchanged from the baseline levels. These changes are summarized in Table 4.3.

TABLE 4.3 ***Average Busy Day*** **Aircraft Operations at McChord AFB after Realignment of Norton AFB Assets and Implementation of Previously Programmed Force Structure Actions**

Unit and Aircraft Type	Departures	Arrivals	Closed Patterns	Total Takeoffs	Total Landings	Total Operations
Assigned Military (C-141)	17.53/0.41[a]	17.53/0.41	45.89/1.07	63.43/1.48	63.43/1.48	126.86/2.96 (129.82)[b]
Transient Military						
Fighter/Trainer	4.96/0.04	4.96/0.04	0.22/0	5.18/0.04	5.18/0.04	10.36/0.08
Cargo/Transport	10.86/2.32	10.86/2.32	0.23/0	11.09/2.32	11.09/2.32	22.18/4.64
Transient Civilian[c]	2.04/0.97	2.04/0.97	0/0	2.04/0.97	2.04/0.97	4.08/1.94
Total Transient						43.28/6.66
Airport Total						170.14/9.62 (179.76)[b]

[a]Indicates day/night operations.

[b]Day plus night operations.

[c]Contractors.

Flight tracks to be used after realignment, shown in Fig. 4.1, would remain essentially unchanged from baseline tracks as illustrated in Fig. 3.3.

Noise-Level Contours

For the 1990 scenario with F-15 and C-130 aircraft removed, the effect of the 33% increase in assigned C-141 operations would produce negligible change in the component C-141 L_{dn} noise-level contours, as can be seen by comparing Fig. B.5 with Fig. B.1 (Appendix B). Similarly, the net change in ground-maintenance component L_{dn} contours would have no significance for community locations (Fig. B.6 compared with Fig. B.4 in Appendix B). However, elimination of the predominant F-15 component (Fig. B.2 in Appendix B) reduces L_{dn} levels in the neighborhoods east of the base, as can be seen by comparing Fig. 4.2 with Fig. 3.4. Table 4.4 compares L_{dn} levels for baseline operations with levels computed for operations after realignment of Norton AFB assets. The day-night noise levels (L_{dn}) at the communities directly east and northeast of the runway (community locations 10 through 12) would be reduced by 9 dB or more. Similar reductions would occur in the communities west and northwest of the runway (locations 1 and 2). In community locations near the northern extension of the runway centerline (e.g., locations 3 through 8), the L_{dn} levels would be reduced only about 1 dB because C-141 approach noise levels predominate along that line. The number of sensitive-receptor locations within the 65-dB L_{dn} contour would be reduced from 9 (baseline) to 6 (after realignment of Norton AFB assets).

Noise Complaints

The removal of assigned F-15 and C-130 aircraft, completed in 1989, is expected to reduce the community noise complaint rate as compared with the 1988 rate.

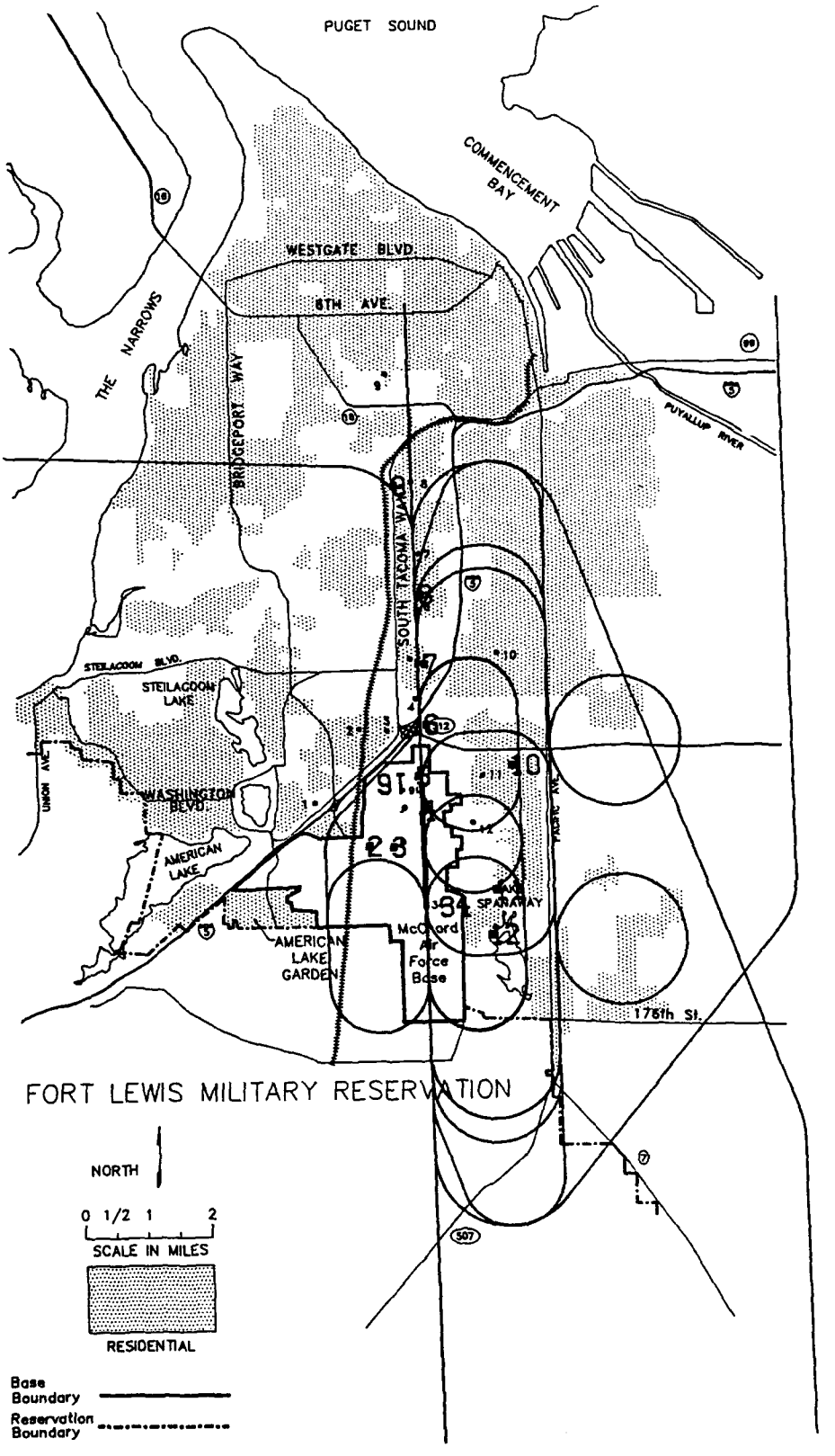

FIGURE 4.1 Ground-Plane Projections of Flight Paths (tracks) for All Operations after Realignment of Norton AFB Assets

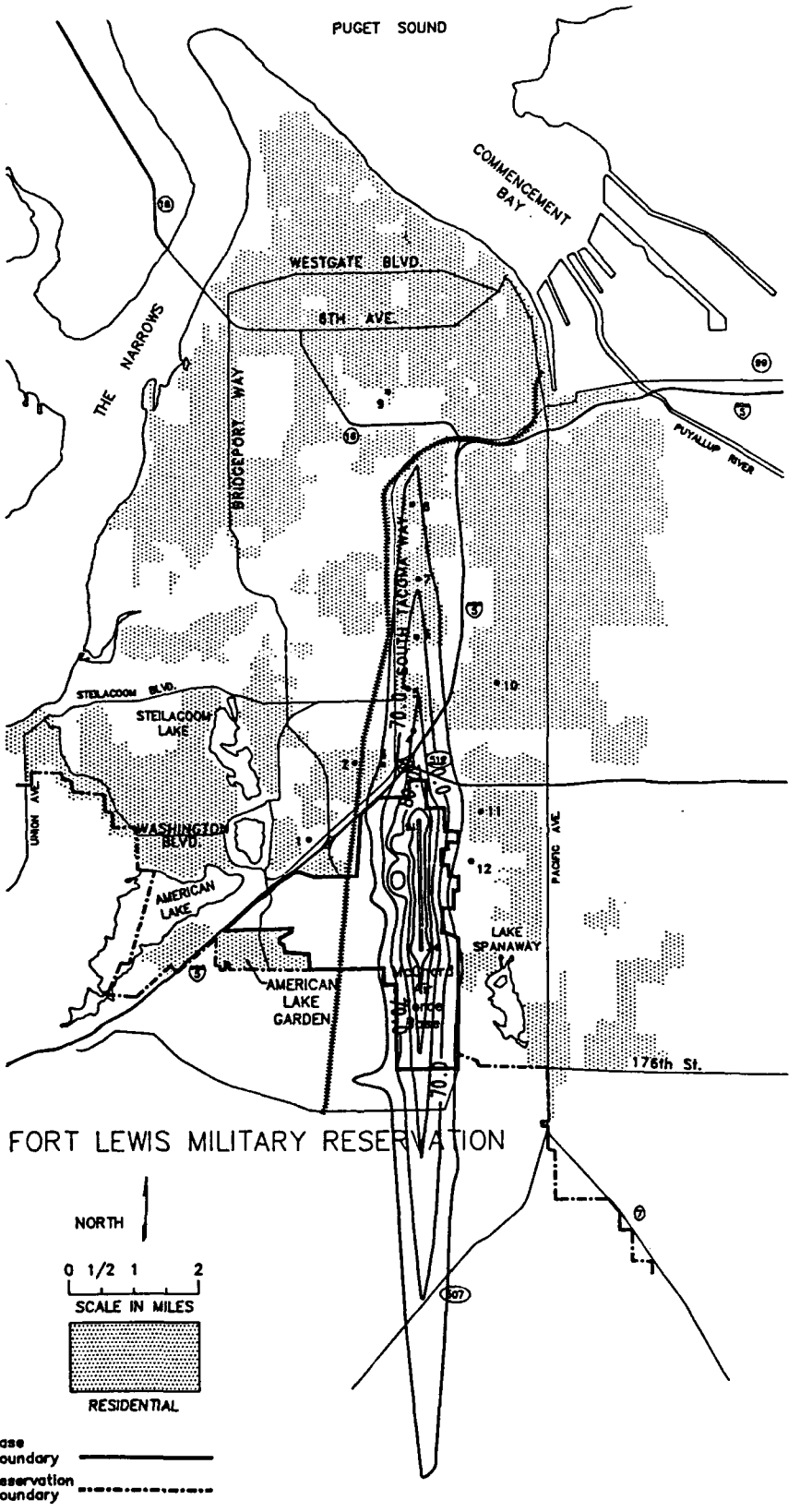

FIGURE 4.2 L_{dn} Contours for All McChord AFB Flight Operations after Realignment of Norton AFB Assets

TABLE 4.4 Baseline L_{dn} Noise Levels Compared with L_{dn} Levels at 12 Off-Site Community Locations near McChord AFB after Realignment of Norton AFB Assets

Location[a]	Description	L_{dn} Noise Levels (dB)		
		Baseline	After Realignment	Change
1	Tyee Park Elementary School	60	40	-20
2	Southgate Elementary School	67	59	-8
3	Residential Area No. 1	71	66	-5
4	Residential Area No. 2	77	75	-2
5	Oakwood Elementary School	74	71	-3
6	Arlington Elementary School	73	72	-1
7	Gray Middle School and Edison High School	69	68	-1
8	Madison Elementary School	67	66	-1
9	Humana Hospital	54	53	-1
10	Baker Junior High School	59	50	-9
11	Sales Elementary School	71	59	-12
12	Keithley Middle School and Washington High School	68	59	-9

[a]Locations are indicated in all figures showing noise contours.

4.1.3 Waste Management and Hazardous Materials

The realignment and basing changes considered in this EA would result in a net reduction of approximately 279 full-time personnel authorizations at McChord AFB (see Table 2.1). These reductions should result in a minor decrease in the amount of sanitary wastewater generated on the base (assuming a generation rate of 60 gal/day per person x 279 people, the reduction would be about 16,740 gal/day). However, depending on the timing of the transfers and force reductions and during the construction activities associated with the changes, small increases in sanitary wastewater could occur over a period of 12-18 months.

Construction of the proposed facilities would generate nonhazardous wastes, such as scrap lumber, metal, and masonry. The possibility of generation of hazardous wastes also exists. The collection and disposal of such wastes would be specified in the construction contract. While the transfer of the active-duty and Reserve assets from Norton AFB to McChord AFB would increase the amount of nonhazardous waste generated by the 62nd MAW and 445th MAW, the deactivation of the 36th TAS and the 318th FIS would result in a net reduction of personnel authorizations and equipment on the base and an overall small reduction of nonhazardous waste generated during routine base operations. Effluents from the current washrack are pumped to the sanitary sewer. Washing of the larger C-141 aircraft would not increase contaminants in the groundwater.

The hazardous wastes generated at McChord AFB are managed in accordance with applicable federal and state laws and USAF regulations (see Sec. 3.2.3). Anticipated operations involving the use or disposal of hazardous waste or materials under this action include maintenance of aircraft aerospace ground equipment, ground vehicles, and the continued management and distribution of petroleum, oil, and lubricants. While the use of JP-4 would increase with transfer of the Norton AFB assets to McChord AFB, the deactivation of the 36th TAS and 318th FIS would partially offset these increases in fuel

use. After all the actions being considered are completed, the kinds and volumes of hazardous wastes generated at the base would remain essentially unchanged.

4.1.4 Water Resources

Because the realignment and basing changes would cause a net reduction in the number of full-time personnel authorizations at the base, potable water requirements would decrease slightly. Water requirements for servicing the aircraft transferred from Norton AFB would increase, but this would be offset by the removal of 8 PAA C-130E aircraft and 18 PAA F-15A/B aircraft. The actions are not expected to adversely affect groundwater.

The construction program associated with the addition of 14 C-141B aircraft could cause some minor disruption of soil during excavation and grading of building, apron, and parking areas. Any impacts would be short-term, pending stabilization of the disturbed sites. Erosion could cause some minor degradation of the on-site drainages, primarily from the introduction of sediments. In addition, runoff from the construction areas would have the potential to add minor amounts of motor oil, hydraulic fluid, or other petroleum products used in construction machinery to nearby drainages. The degree of degradation would depend in part on the effectiveness of the established stormwater runoff system and measures to contain sediments before they reach permanent stream channels. Because the soils are sandy, most sediments would be trapped in ditches and intermittent flowing drainages; Clovis and Morey creek fish populations should not be impacted.

4.1.5 Vegetation and Wildlife Resources

None of the proposed construction activities would alter natural vegetation or forest cover on the base. Impacts would be limited to mowed or landscaped vegetation that occurs on the industrial and aircraft mobilization portion of McChord AFB

(Department of the Air Force 1987a). Because animal habitat on the base would not be altered, impacts to wildlife would be minimal.

4.1.6 Threatened and Endangered Species

The destruction of small areas of vegetation within the industrial and aircraft mobilization areas of McChord AFB would not affect federal or state threatened and endangered species.

4.1.7 Socioeconomics

The changes that would occur at McChord AFB would result in the loss of 258 full-time military personnel authorizations and 21 full-time civilian personnel authorizations for a total reduction of 279. In addition, 461 part-time military Reserve Drill personnel authorizations will be added. It is most likely that all active military personnel not required at McChord AFB would be transferred to other USAF bases. Given the large size of the civilian employment in Pierce County, these changes would result in minimal impact to the local economy. The construction activities associated with the conversion would provide some short-term economic benefits to the area in the form of employment and the local purchase of building supplies.

4.1.8 Cultural Resources

A survey for archaeological sites and historic structures was recently conducted at McChord AFB by the National Park Service (NPS) (Pittman 1989; Calliott 1989). Based on this survey, NPS recommendations of no adverse effect to significant archaeological sites and historic structures have been sent to the Washington State SHPO (Rodeffer 1989; see also Hansen 1989). The SHPO will determine if McChord AFB will be given cultural resource clearance for the proposed construction/modification projects. Although no formal determination of no effect has been issued to date by the SHPO, one is expected in the near future.

4.1.9 Land Use

Construction of the new facilities associated with the realignments and basing changes would occur in areas already used to support the MAC aircraft mission at McChord AFB (Fig. 2.1). This part of the base contains all facilities involved in aircraft mobilization and maintenance activities. Current land use plans at McChord AFB designate this area of the base as suitable for continued industrial-type development. Family housing and recreation areas at the base would not be impacted by the construction of new aircraft staging areas or support buildings.

Table 4.5 compares the projected number of off-site residents and occupied housing units within L_{dn} zones before and after the realignment and implementation of previously programmed force structure changes. Since the L_{dn} noise levels for McChord AFB after Norton AFB closure are less than existing levels, causing a shrinkage of the noise contours in all directions, the closure would result in a reduction in the number of people and occupied housing units exposed to noise levels above 65 dB. Additionally, the more noise-sensitive areas in the vicinity of McChord AFB would be exposed to lower average noise levels as a result of the Norton closure.

4.1.10 Land Traffic

Although construction activities would generate minor, temporary increases in traffic volumes on Bridgeport Way, these increases would not cause adverse effects on traffic flow. The reduction of full-time personnel at McChord AFB upon implementation of all the realignment actions and previously programmed force structure actions would have a beneficial effect on traffic flow at all gates and on the base.

4.1.11 Airspace

Low-altitude training requirements for the 14 C-141 aircraft being transferred from Norton AFB (12 aircraft) and Travis AFB (2 aircraft) would be about the same as

TABLE 4.5 Comparative Numbers of Off-Site Residents and Occupied Housing Units within L_{dn} Zones before and after the Realignment of Norton AFB Assets and Implementation of Previously Programmed Force Structure Changes

L_{dn} Zone (dB)	Number of Residents	Number of Occupied Housing Units
Before		
65-70	17,807	7,752
70-75	9,349	3,902
75-80	2,440	1,109
80-85	36	15
>85	0	0
After		
65-70	8,134	3,610
70-75	4,786	2,165
75-80	1,058	483
80-85	36	15
>85	0	0

existed when 16 PAA C-130 aircraft were assigned to McChord AFB (see Sec. 3.2.11). However, the C-141 is somewhat noisier than the C-130, so noise levels in the training areas could increase.

No changes will occur in the type of training operations conducted by the C-141 aircraft. However, there will be an increase of about one-third in the number of C-141 training operations above baseline conditions (Sec. 3.2.11) because of increased number of C-141 assigned to the base.

The deactivation of the 318th FIS will not affect the special use airspace structure used for F-15 training. The Roosevelt, Olympic A/B, and Okanogan MOAs will continue to be utilized by Navy units from NAS Whidbey Island and associated carrier battle groups. Warning Areas 237 A/B and 570 also will continue to be heavily used by the Navy units. Area W-570 will continue to be used by the 142 Fighter Interceptor Group from both Kingsley Field and Portland, Oregon. Because of the relative size of the 318th FIS and the variety of training airspaces available, total airspace usage should not decrease appreciably.

4.1.12 Flight Safety

The realignment actions and other changes will require no modification of flight safety procedures at McChord AFB.

4.2 MITIGATIVE MEASURES

The only necessary mitigative measures identified are those routinely implemented to control generation of fugitive dust and to minimize runoff and erosion during the construction activities associated with the actions evaluated. Noise abatement procedures that have been instituted will continue to be enforced.

5 REFERENCES*

Air National Guard, 1989a, *Addendum to Finding of No Significant Impact, Proposed Aircraft Conversion, 142nd Fighter Interceptor Group, Portland, Oregon*, Directorate Air National Guard, Washington, D.C.

Air National Guard, 1989b, *Air Force Form 813 (Categorical Exclusion)*, Air National Guard SC/DEV, Aug. 10.

Calliott, P., 1989, Headquarters, Military Airlift Command, Scott Air Force Base, Ill., personal communication, June.

Calliott, P., 1990, Headquarters Military Airlift Command, Scott Air Force Base, Ill., personal communication, Jan.

Committee on Hearing, Bioacoustics, and Mechanics, Working Group 69, 1977, *Guidelines for Preparing Environmental Impact Statements on Noise*, National Research Council, National Academy of Sciences, Washington, D.C.

Department of the Air Force, 1976, *Air Installation Compatible Use Zone Study*, McChord Air Force Base, Wash., Dec.

Department of the Air Force, 1984, *Air Installation Compatible Use Zone (AICUZ) Handbook*, Directorate of Engineering and Services, Washington, D.C., HQ Air Force Engineering and Services Center, Tyndall Air Force Base, Florida, Sept.

Department of the Air Force, 1985, *Hazardous Materials and Dangerous Waste Management Plan*, Headquarters 62nd Air Base Group, McChord Air Force Base, Wash., May.

Department of the Air Force, 1986, *Final Report: Installation Restoration Program, Phase II - Confirmation/Quantification, Stage 2*, Military Airlift Command, HQ MAC/SGPB, Scott Air Force Base, Ill., April.

Department of the Air Force, 1987a, *McChord Air Force Base 2001 Plan*, McChord Air Force Base, Wash.

Department of the Air Force, 1987b, *Final Environmental Impact Statement for Proposed Air Force Reserve Mission Changes (C-130 to C-5A Aircraft) and Westover Metropolitan Development Corporation (Expansion of Civil Aviation Operations through 1995) at Westover Air Force Base, Massachusetts*, Headquarters, Air Force Reserve, Robins Air Force Base, Ga., April.

*The term *personnel communication* is used in this report to denote face-to-face conversations or telephone conversations. Copies of correspondence included in this list are available upon request from G. Marmer, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, Argonne, Ill. 60439.

Department of the Air Force, 1987c, *Addendum No. 2 to Environmental Assessment for Deactivation of One C-130 Squadron*, 62 ABG/DEEV, McChord Air Force Base, Wash., Feb.

Department of the Air Force, 1988a, *McChord Air Force Base Economic Resource Impact Statement*, 62nd Comptroller Squadron, Military Airlift Command, McChord Air Force Base, Wash.

Department of the Air Force, 1988b, *Homestead AFB AICUZ 1988*, Homestead Air Force Base, Fla.

Department of the Air Force, 1989, *Description of Proposed Action and Alternatives for Realignment of Units at McChord AFB, Washington*, Headquarters Military Airlift Command, Scott Air Force Base, Ill.

Hansen, D.M., 1989, Deputy State Historic Preservation Officer, Olympia, Washington, letter to A.H. Dreimeier, chief engineer, McChord Air Force Base, Wash., Oct. 9.

Hayes, J., 1990, Puget Sound Air Pollution Control Agency, Seattle Wash., personal communication, Jan.

JRB Associates, 1984, *Geohydrologic Evaluation and Chemical Investigations for McChord Air Force Base, Washington*, prepared for U.S. Air Force, Occupational Environmental Health Laboratory, Brooks Air Force Base, San Antonio, June.

Krug, W., 1989, Washington Department of Ecology, Olympia, Wash., personal communications, June, September.

Krug, W., 1990, Washington Department of Ecology, Olympia, Wash., personal communication, Jan.

Pittman, R., 1989, McChord Air Force Base, Wash., personal communication, June.

Rodeffer, S.H., 1989, chief, Interagency Archeological Services Branch, State Office of Archaeology and Historic Preservation, Olympia, Wash., letter to P. Calliott, Headquarters, Military Airlift Command, Scott Air Force Base, Ill., Sept. 15.

Schultz, T.J., 1978, *Synthesis of Social Surveys on Noise Annoyance*, J. of the Acoustical Society of America, 64(2):377-405, Aug.

Seitchek, G.D., 1985, *Aircraft Engine Emissions Estimator*, Air Force Engineering and Services Center Report ESL-TR-85-14, Headquarters AFESC/RDVS, Tyndall Air Force Base, Fla., Nov.

U.S. Bureau of the Census, 1983, *County and City Data Book*, U.S. Government Printing Office, Washington, D.C.

U.S. Bureau of the Census, 1986, *Provisional Estimates of the Population of Counties: July 1, 1985*, Current Population Reports, Local Population Estimates, Series P-26, No. 85-52-C, U.S. Government Printing Office.

U.S. Bureau of the Census, 1987, *West, 1986 Population and 1985 Per Capita Income: Estimates for Counties and Incorporated Places*, Current Population Reports, Local Population Estimates, Series P-26, No. 86-WSC, U.S. Government Printing Office.

U.S. Environmental Protection Agency, 1982, *Guidelines for Noise Impact Analysis*, Office of Noise Abatement and Control Report 550/9-81-105, Washington, D.C., April.

Washington Department of Ecology, 1988, *Washington State Air Monitoring Data for 1987*, Air Programs Division, Olympia, Wash., Sept.

Wells, W., 1990, Headquarters, Military Airlift Command, MAC/DEEE, Scott Air Force Base, Ill., personal communication.

6 LIST OF PREPARERS

This Environmental Assessment has been prepared by the Department of the Air Force, Military Airlift Command, with contractual assistance from the Environmental Assessment and Information Sciences Division, Argonne National Laboratory (ANL). The following ANL staff members contributed to the preparation of this report:

Name	Education/Expertise	Contribution
Gary J. Marmer	Ph.D. Physics 17 years experience in environmental assessment	Project leader
Larry R. Coke	M.S. Physics 15 years experience in environmental modeling	NOISEMAP computations
John D. DePue	M.S. Biology 20 years experience in editing and journalism	Technical editor
Richard E. Liebich	B.E.E. Electrical Engineering (P.E.) 35 years experience in applied acoustics and electroacoustics	Noise
John R. Krummel	Ph.D. Population Ecology 11 years experience in ecological research and assessment	Land use, hazardous wastes, biotic resources, threatened and endangered species, water resources
Konstance L. Moeller	B.A. Anthropology 2 years experience in archaeological research	Cultural resources
S. Jay Olshansky	Ph.D. Sociology/ Demography 8 years experience in sociological research and assessment	Population statistics, socioeconomics

Anthony J. Policastro	Ph.D. Civil Engineering 18 years experience in air pollution assessment	Air quality
Karen L. Woytowich	B.S. Mathematics and Computer Science 3 years experience in applied mathematics and computer operations	NOISEMAP computations

APPENDIX A:

L_{dn} METHODOLOGY

APPENDIX A:

L_{dn} METHODOLOGY

A.1 NOISE ENVIRONMENT DESCRIPTOR (L_{dn})

The day-night average sound level (L_{dn}) metric for describing the noise environment was used to produce the noise contours presented in this assessment (Acoustical Society of America 1980). Efforts to provide a national uniform standard for noise assessment have resulted in adoption of L_{dn} by the U.S. Environmental Protection Agency (EPA) as the standard measure of noise for this procedure. It is used by numerous federal agencies, including the Department of Defense, Department of Housing and Urban Development, and the Federal Aviation Administration.

Use of the L_{dn} descriptor is a method of assessing the amount of exposure to aircraft noise and predicting the percentage of residents in a well-populated community that are highly annoyed by the various levels of exposure (Committee on Hearing, Bioacoustics, and Mechanics 1977; Schultz 1978). The L_{dn} values used for planning purposes and for which contours are presented in this assessment are 65, 70, 75, 80, and 85 dB. Land use guidelines are based on the compatibility of various land uses with these exposure levels (U.S. Department of Defense 1964).

It is generally recognized that a noise environment descriptor should consider, in addition to the annoyance of a single event, the effect of repetition of such events and the time of day in which these events occur. Computation begins with a single-event energy descriptor and adds corrections for the number of events and the time of day. Since the primary noise impact relates to residential areas, nighttime events are considered more annoying than daytime events and are weighted 10 dB accordingly. The L_{dn} values are computed by first logarithmically summing the single-event energy values for all of the flight operations in a typical 24-hour day (after adding the 10 dB penalty to all nighttime-operation levels); then the average sound level is calculated for a 24-hour period.

As part of an extensive data-collection process, detailed information is gathered on the flight tracks flown by each type of aircraft assigned to the base and the number and time of day of flights on each of these tracks during a typical day. This information is used in conjunction with the single-event noise descriptor to produce L_{dn} values. These values are combined on an energy-summation basis to provide single L_{dn} values for the mix of aircraft operations at the base. Equal value points are connected to form the contour lines.

A.2 SINGLE-EVENT NOISE EVENT DESCRIPTOR (SEL)

The single-event noise energy descriptor used in the L_{dn} system is the sound exposure level (SEL). The SEL measure is an integration of the A-weighted sound pressure level over the time interval of a single event (such as an aircraft flyover), corrected to equivalent level for a reference period of 1 second. Frequency, magnitude,

and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are collected for various types of aircraft/engines at different power settings and phases of flight. SEL versus slant range values are derived from noise measurements made according to a source noise data acquisition plan developed by Bolt, Beranek and Newman, Inc., in conjunction with the Armstrong Aerospace Medical Research Laboratory (AAMRL) and carried out by AAMRL (Bishop and Galloway 1975). These standard-day, sea-level values form the basis for the individual-event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, humidity, altitude, and variations from standard aircraft operating profiles and power settings.

Ground-to-ground sound propagation characteristics are used for ground run-up activities. Air-to-ground propagation characteristics are used whenever the aircraft is airborne and the line-of-sight from observer to aircraft is 7 degrees or greater above horizontal; if the line-of-sight is 4 degrees or less, ground-to-ground propagation characteristics are used. Between these angles, propagation characteristics are interpolated (Speakman et al. 1977).

In addition to use for assessing aircraft flight operations, the L_{dn} metric can also be used to assess aircraft and engine run-up noise emissions resulting from engine/aircraft maintenance checks on the ground. Sounds such as aircraft/engine ground run-up noise are essentially constant in level during each test run at a given power setting. Data on the orientation of the noise source, type of aircraft or engine, number of test runs on a typical day, the power settings used and their duration, and use of suppression devices are collected for each ground run-up test position. This information is processed along with "mean sound pressure level" (average-energy level) data to yield equivalent 1-second sound exposure levels, which are added (on an energy-summation basis) to the SEL levels generated by flight operations to produce L_{dn} contours reflecting the overall noise environment produced by both air and ground operations of aircraft.

A.3 NOISE CONTOUR PRODUCTION

Data describing flight tracks, flight profiles, power settings, flight paths and profile utilization, and ground run-up information by type of aircraft/engine are assembled and processed for input into a central computer. L_{dn} contours are generated by the computer using the airfield-supplied operational data and the standard source-noise data corrected to local conditions. The computer system plots these contours, which are provided in the text.

A.4 NOISEMAP COMPUTER PROGRAM

The L_{dn} methodology is implemented by use of the NOISEMAP computer program for military flight operations of fixed-wing aircraft. NOISEMAP was initially developed in 1974 by the Air Force (Horonjeff et al. 1974) and utilizes subsidiary codes (OMEGA and OMEGA 11) to provide a file of military flight and ground maintenance operational data by aircraft type.

A.5 REFERENCES

Acoustical Society of America, 1980, American National Standard Sound Level Description for Determination of Compatible Land Use, ANSI S3.23-1980 (R1986), New York.

Bishop, D.E., and W.J. Galloway, 1975, Community Noise Exposure Resulting from Aircraft Operations: Acquisition and Analysis of Aircraft Noise and Performance Data, U.S. Air Force Aerospace Medical Research Laboratory Report AMRL-TR-73-107, Wright-Patterson Air Force Base, Dayton, Ohio, Aug.

Committee on Hearing, Bioacoustics, and Mechanics, Working Group 69, 1977, Guidelines for Preparing Environmental Impact Statements on Noise, National Research Council, National Academy of Sciences, Washington, D.C.

Horonjeff, R.D., R.R. Kandukuri, and N.H. Redingius, 1974, Community Noise Exposure Resulting from Aircraft Operations; Computer Program Description, Aerospace Medical Research Laboratory Report AMRL-TR-73-109, Wright-Patterson Air Force Base, Dayton, Ohio, prepared by Bolt Beranek and Newman, Inc., Canoga Park, Calif., Nov.

Schultz, T.J., 1978, Synthesis of Social Surveys on Noise Annoyance, J. of the Acoustical Society of America, 64:377-405.

Speakman, J.D., R.G. Powell, and J.N. Cole, 1977, Community Noise Exposure Resulting from Aircraft Operations: Volume 1. Acoustic Data on Military Aircraft, U.S. Air Force Aerospace Medical Research Laboratory Report AMRL-TR-73-110(1), Wright-Patterson Air Force Base, Dayton, Ohio, Nov.

U.S. Department of Defense, 1964, Land Use Planning with Respect to Aircraft Noise, Report AFM 86-5, TM 5-365, NAVDOCKS P-98, Washington, D.C., Oct. 1.

APPENDIX B:

BASELINE AIRCRAFT OPERATIONS AND COMPONENT L_{dn} CONTOUR PLOTS

TABLE B.1 Baseline *Average Busy Day* Aircraft Operations at McChord AFB

Unit and Aircraft Type	Departures	Arrivals	Closed Patterns	Total Takeoffs	Total Landings	Total Operations
Assigned Military						
F-15	15.1/1.8[a]	15.1/1.8	16.5/1.8	31.6/3.6	31.6/3.6	63.2/7.2
C-130	2.41/0.41	2.41/0.41	5.70/1.12	8.11/1.53	8.11/1.53	16.22/3.06
C-141	13.15/0.31	13.15/0.31	34.42/0.80	47.57/1.11	47.57/1.11	95.14/2.22
Total Assigned						174.56/12.48 (187.04)[b]
Transient Military						
Fighter/Trainer						
A-4	0.23/0	0.23/0	0.02/0	0.25/0	0.25/0	0.50/0
A-6	0.59/0.01	0.59/0.01	0/0	0.59/0.01	0.59/0.01	1.18/0.02
A-7	0.14/0	0.14/0	0.02/0	0.16/0	0.16/0	0.32/0
A-10	1.42/0	1.42/0	0.02/0	1.44/0	1.44/0	2.88/0
F-4	0.35/0.03	0.35/0.03	0.02/0	0.37/0.03	0.37/0.03	0.74/0.06
F-14	0.03/0	0.03/0	0/0	0.03/0	0.03/0	0.06/0
F-15	0.28/0	0.28/0	0/0	0.28/0	0.28/0	0.56/0
F-16	0.65/0	0.65/0	0.02/0	0.67/0	0.67/0	1.34/0
F-18	0.08/0	0.08/0	0/0	0.08/0	0.08/0	0.16/0
F-86	0.14/0	0.14/0	0/0	0.14/0	0.14/0	0.28/0
F-106	0.07/0	0.07/0	0/0	0.07/0	0.07/0	0.14/0
F-111	0.04/0	0.04/0	0/0	0.04/0	0.04/0	0.08/0
T-33	0.30/0	0.30/0	0.02/0	0.32/0	0.32/0	0.64/0
T-37	0.12/0	0.12/0	0/0	0.12/0	0.12/0	0.24/0
T-38	0.36/0	0.36/0	0.10/0	0.46/0	0.46/0	0.92/0
T-43	0.05/0	0.05/0	0/0	0.05/0	0.05/0	0.10/0
T-114	0.11/0	0.11/0	0/0	0.11/0	0.11/0	0.22/0
Subtotal						10.36/0.08

TABLE B.1 (Cont'd)

Unit and Aircraft Type	Departures	Arrivals	Closed Patterns	Total Takeoffs	Total Landings	Total Operations
Cargo/Transport						
TC-4	0.04/0	0.04/0	0/0	0.04/0	0.04/0	0.08/0
C-5	0.73/0.33	0.73/0.33	0/0	0.73/0.33	0.73/0.33	1.46/0.66
C-9	1.11/0.09	1.11/0.09	0/0	1.11/0.09	1.11/0.09	2.22/0.18
C-10	0.04/0.03	0.04/0.03	0/0	0.04/0.03	0.04/0.03	0.08/0.06
KC-10	0.29/0.06	0.29/0.06	0/0	0.29/0.06	0.29/0.06	0.58/0.12
VC-10	0.11/0.01	0.11/0.01	0/0	0.11/0.01	0.11/0.01	0.22/0.02
C-12	0.22/0	0.22/0	0/0	0.22/0	0.22/0	0.44/0
C-21	0.22/0.02	0.22/0.02	0.01/0	0.23/0.02	0.23/0.02	0.46/0.04
C-130	2.69/0.37	2.69/0.37	0.20/0	2.89/0.37	2.89/0.37	5.78/0.74
C-131	0.17/0	0.17/0	0/0	0.17/0	0.17/0	0.34/0
C-135	0.18/0	0.18/0	0.02/0	0.20/0	0.20/0	0.40/0
C-140	0.04/0	0.04/0	0/0	0.04/0	0.04/0	0.08/0
C-141	4.85/1.39	4.85/1.39	0/0	4.85/1.39	4.85/1.39	9.70/2.78
E-3	0.11/0.01	0.11/0.01	0/0	0.11/0.01	0.11/0.01	0.22/0.02
P-3	0.06/0.01	0.06/0.01	0/0	0.06/0.01	0.06/0.01	0.12/0.02
Subtotal						22.18/4.64
Transient Civil[c]						
B-707	0.04/0.05	0.04/0.05	0/0	0.04/0.05	0.04/0.05	0.08/0.10
B-747	0.13/0.22	0.13/0.22	0/0	0.13/0.22	0.13/0.22	0.26/0.44
DC-10	0.40/0.02	0.40/0.02	0/0	0.40/0.02	0.40/0.02	0.80/0.04
L-188	1.11/0.03	1.11/0.03	0/0	1.11/0.03	1.11/0.03	2.22/0.06
L-382	0.06/0.65	0.06/0.65	0/0	0.06/0.65	0.06/0.65	0.12/1.30
MU-2	0.30/0	0.30/0	0/0	0.30/0	0.30/0	0.60/0
Subtotal						4.08/1.94

TABLE B.1 (Cont'd)

Unit and Aircraft Type	Departures	Arrivals	Closed Patterns	Total Takeoffs	Total Landings	Total Operations
Total Transient						43.28/6.66
Airport Total						211.18/19.14 (230.32)[b]

[a]Indicates day/night operations.

[b]Day plus night operations.

[c]Contractors.

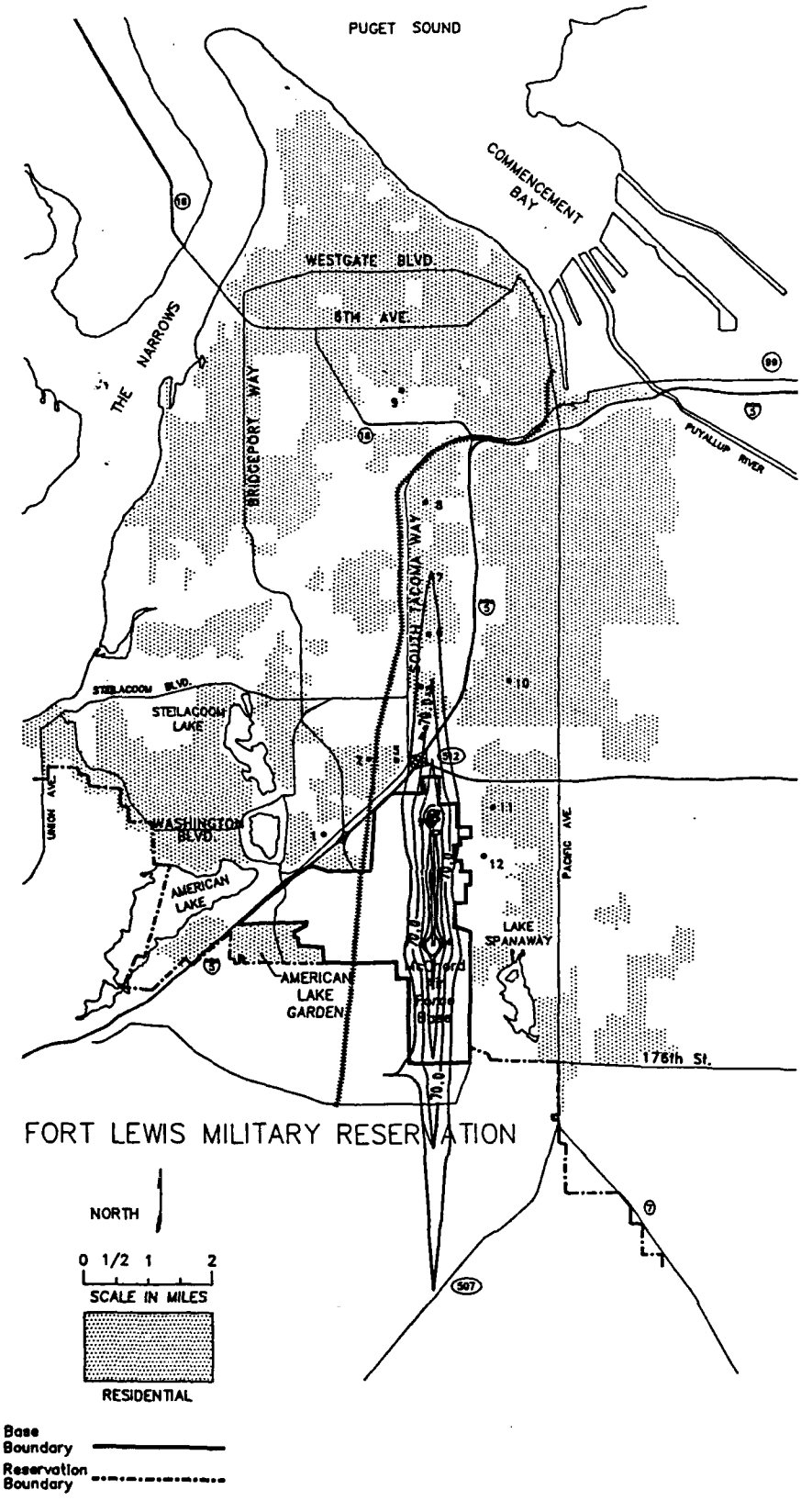

FIGURE B.1 Baseline L_{dn} Contours for C-141 Aircraft Operations Only

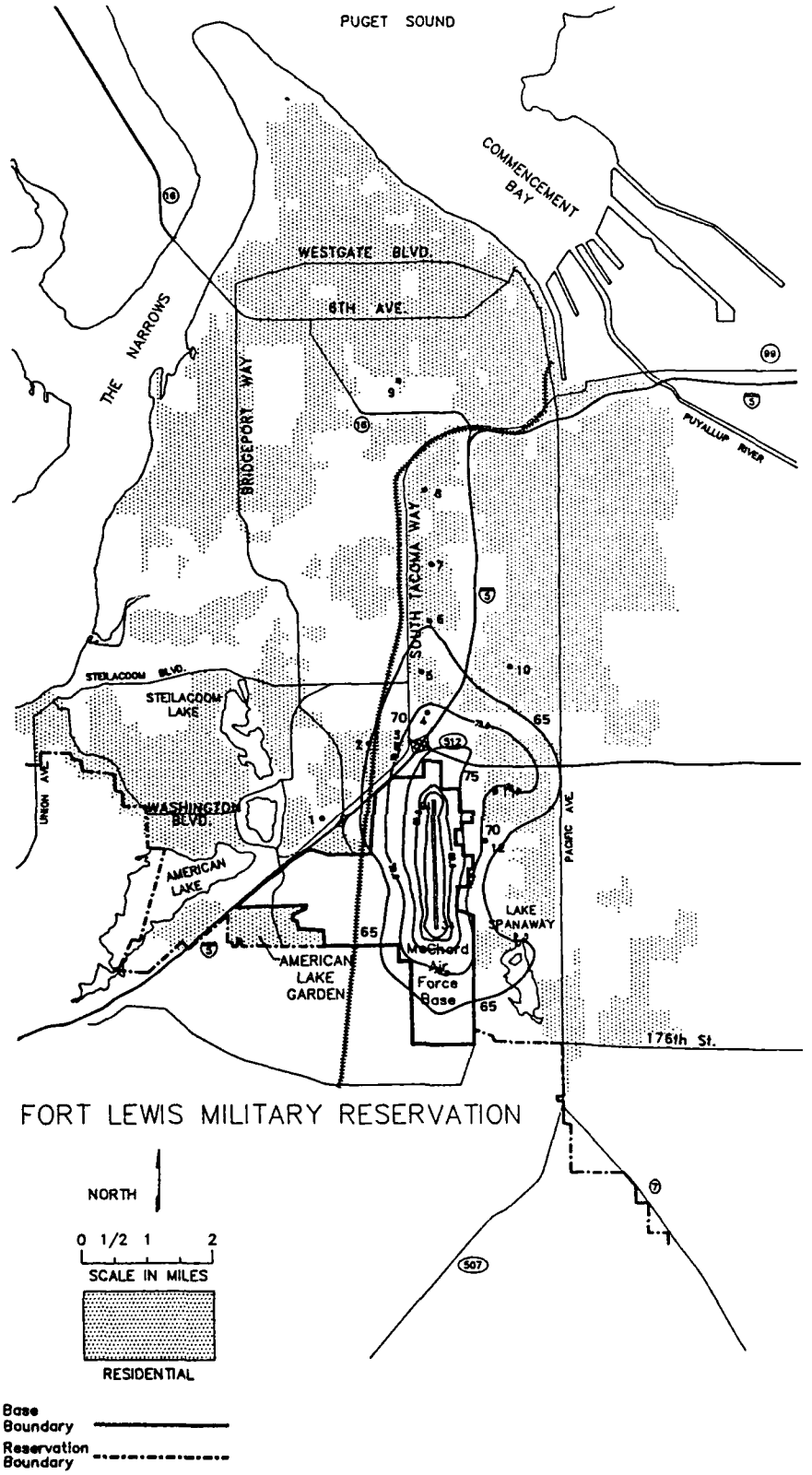

FIGURE B.2 Baseline L_{dn} Contours for F-15 Aircraft Operations Only

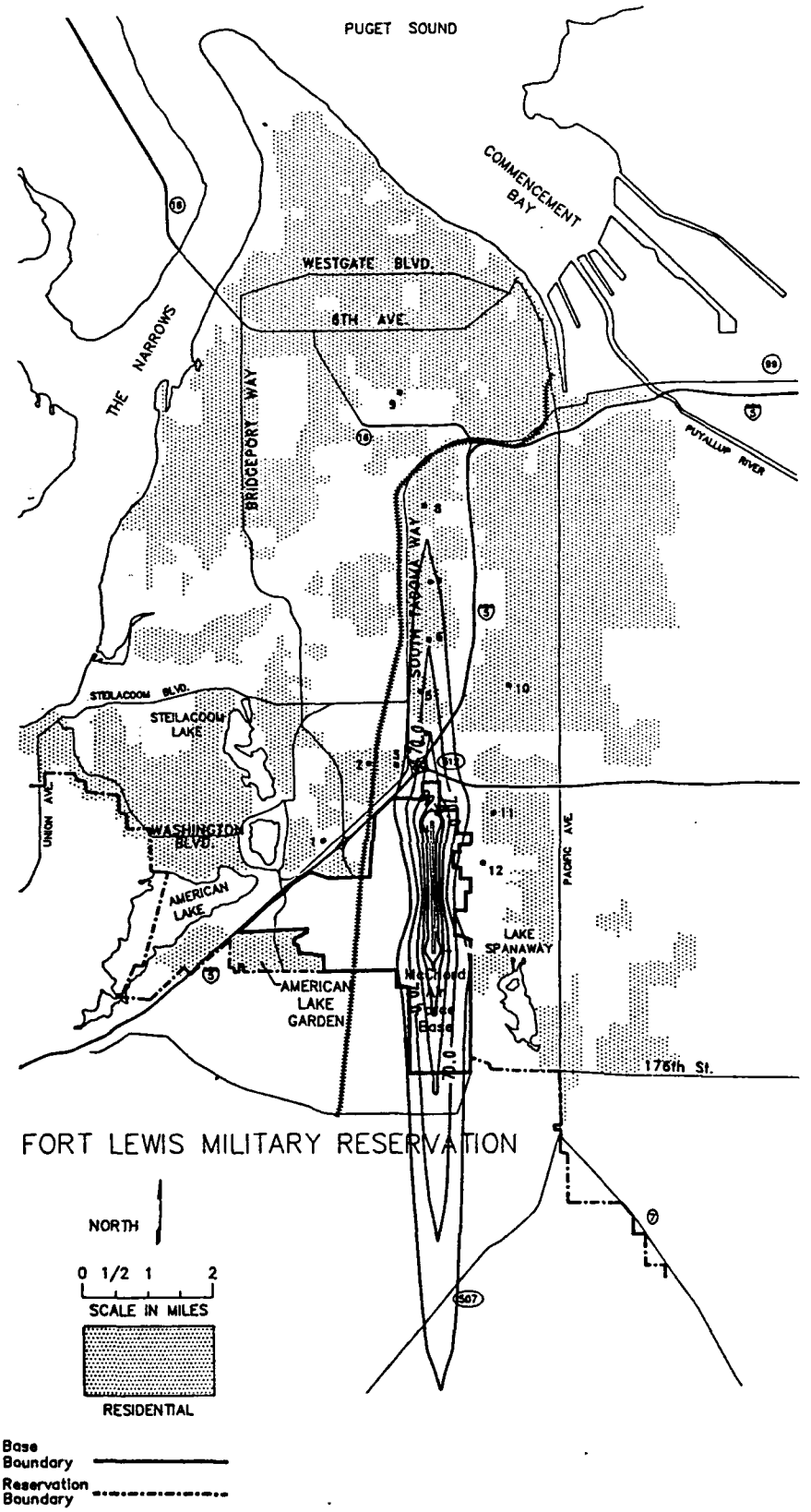

FIGURE B.3 L_{dn} Contours for All Transient Aircraft Operations Only (baseline and after realignment of Norton AFB assets)

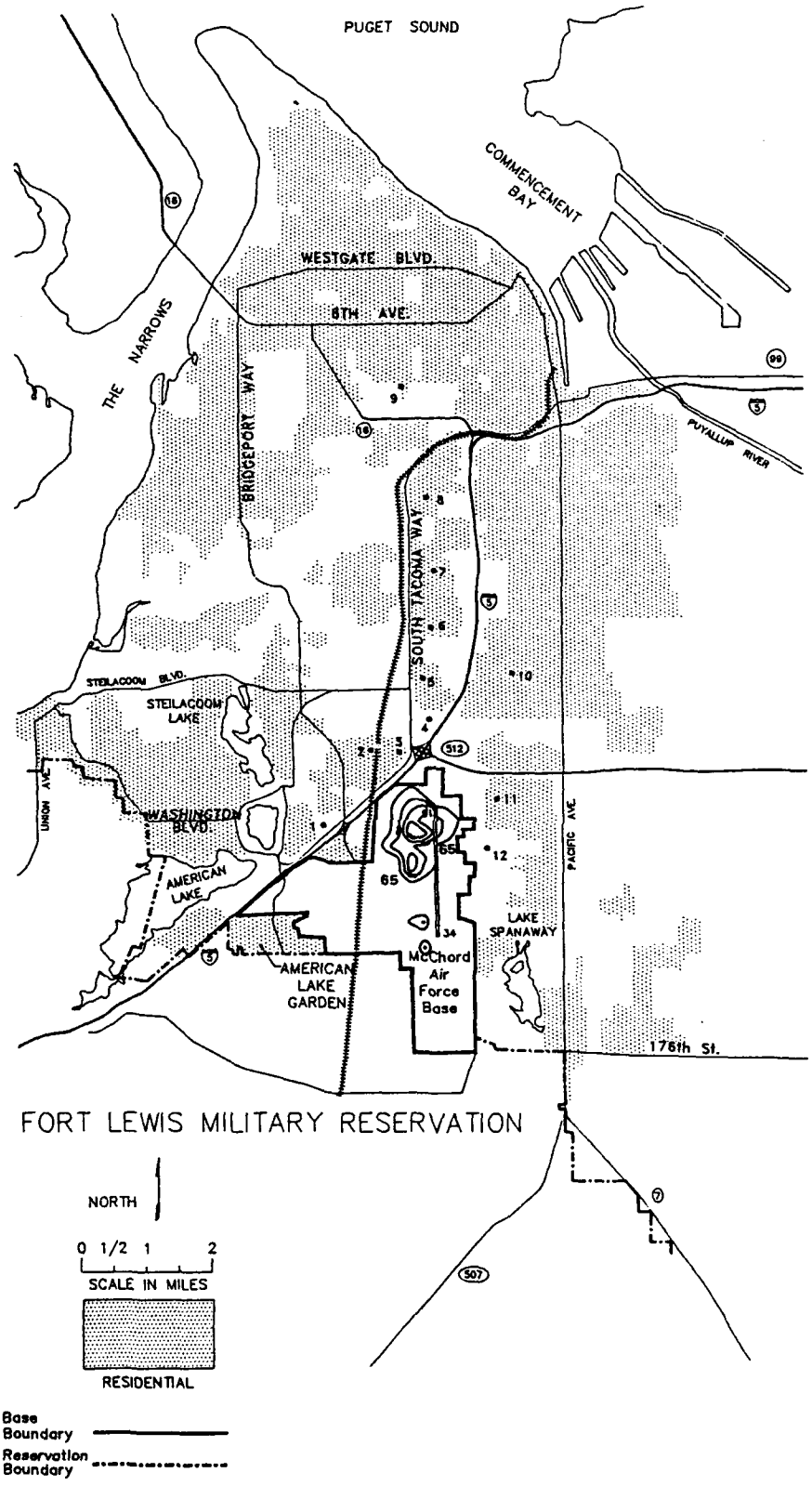

FIGURE B.4 Baseline L_{dn} Contours for Ground Run-Up Operations Only

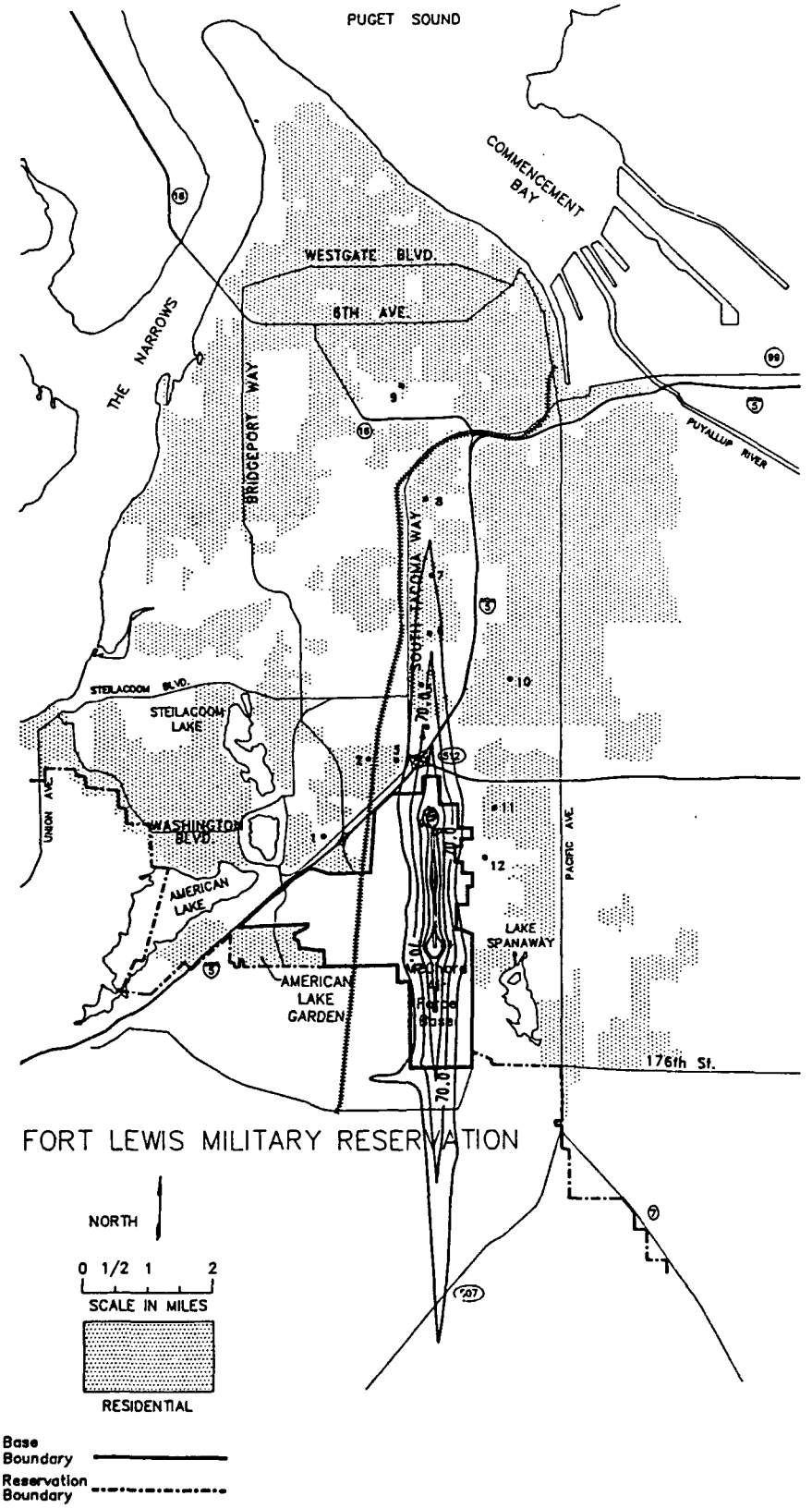

FIGURE B.5 L_{dn} Contours for McChord AFB C-141 Aircraft Only after Realignment of Norton AFB Assets

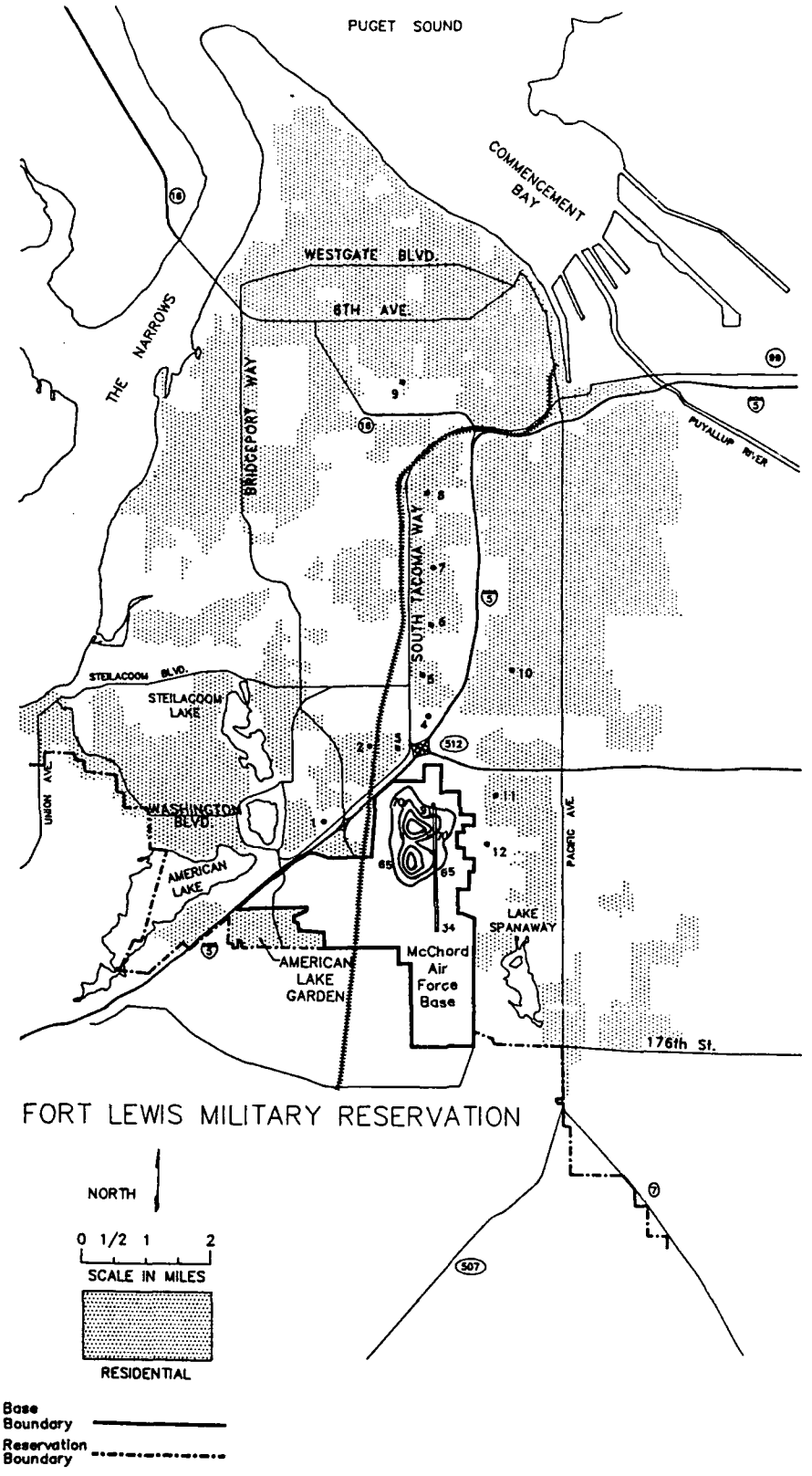

FIGURE B.6 L_{dn} Contours for McChord AFB Ground Run-Up Operations Only after Realignment of Norton AFB Assets